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ARCHIVES
OF
OTOLOGY

EDITED IN ENGLISH AND GERMAN

BY

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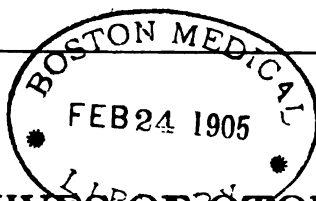
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ARCHIVES OF OTOTOLOGY.

OSTEO-MYELITIS OF THE TEMPORAL AND ADJACENT BONES OF THE SKULL AS A SEQUEL OF OTITIS MEDIA SUPPURATIVA.¹

BY DR. CHARLES W. RICHARDSON, WASHINGTON, D. C.

(With one temperature chart.)

ACUTE suppurative osteo-myelitis is a term used to designate an infectious disease of the bone, usually beginning in the marrow, extending through the cancellated structure, terminating in suppuration, and attended with evidence of profound constitutional infection. The definition of this term, as usually found in text-books on surgery, is not at all satisfying. Most authors define it as a disease starting in the myeloid tissue, and, in the same chapter, give the proportionate frequency of osteo-myelitis as it affects the long and the flat bones. When one, therefore, speaks of osteo-myelitis, the thought of his auditors naturally turns to this disease as affecting the long bones. The flat bones are not exempt, however, from this serious form of bone infection. Dennis, quoting W. W. Keen, gives the comparative frequency of primary osteo-myelitis in the long and flat bones as fifty-five to twenty-two, as a sequela to the acute infectious diseases.

As is well known, this disease appears as the result of the presence in pathogenic quantity of one or more forms of micro-organisms. These micro-organisms may gain access to the area affected directly through the lymph channels or nerve sheaths, or indirectly through the medium of the circulation.

¹ Read at meeting of Section on Otology of New York Academy of Medicine, November 12, 1903.

The micro-organisms which are the most potent agents in producing this disturbance are the staphylococcus pyogenes and the streptococci. The direct method is the usual manner by which osteo-myelitis is occasioned in the temporal and adjacent bones, when resulting as a complication of suppurative otitis. Besides the local symptoms, the most characteristic evidence of an osteo-myelitis as affecting the bones of the temporal region is the profound constitutional intoxication, as indicated by the marked general depression and the high temperature curve. The temperature assumes almost the characteristic wave of a serious typhoid case. This marked general infection, early appearing œdema, and extensive area of tenderness seem to differentiate this condition in its early stages from a typical case of suppurative mastoiditis. In the later stages of the case, the occurrence of secondary foci of tenderness, infiltration, and abscess formation at points more or less distant from the original seat of infection, with which direct communication through the diploë may be made, should make the diagnosis very clear.

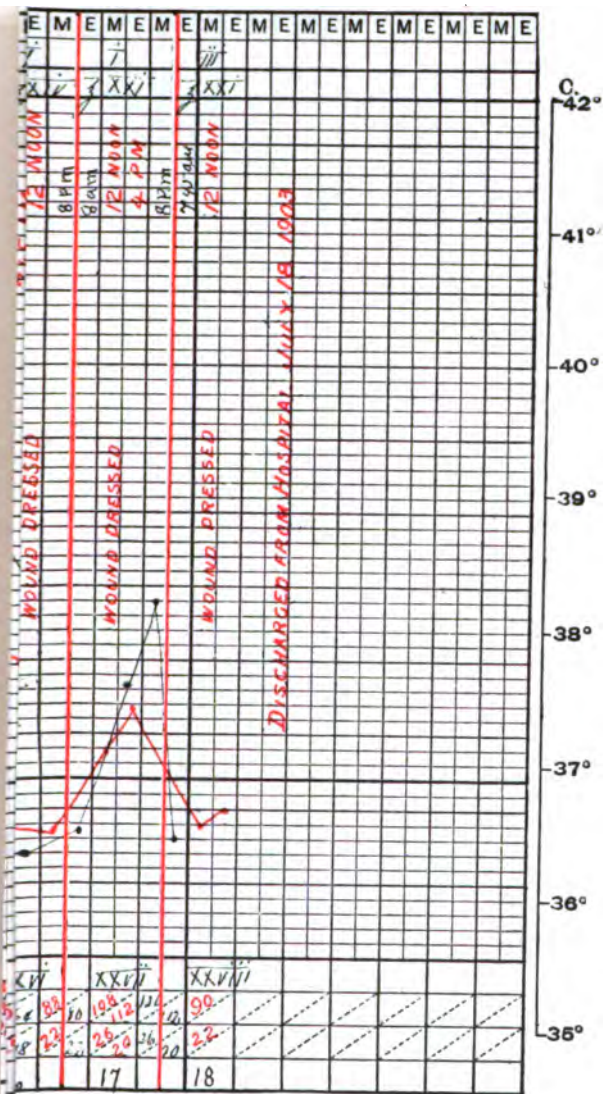
My attention was first actively directed to the consideration of this disease as affecting the temporal bone by the occurrence of a well marked case in a patient upon whom I had operated for mastoid abscess, without appreciating the gravity of the situation and the true character of the infection until some days after the original operation. As the case progressed, I became impressed with the seriousness of the symptoms and also as to their character. This case was reported by me before the Section of Laryngology and Otology of the American Medical Association, held at Atlantic City, N. J., June, 1900. My interest in the subject has been very much alive since my first case, but I was unable to make any further practical study of this subject until the past summer, when I had a second most typical case presented to me for operation. This second was almost a "book case" as to every feature that goes to make up a perfect clinical picture of osteo-myelitis. This latter case, with its typical temperature curve, the typhoid symptoms, and the rapid extension of the lesion through the diploë tissue of the bone to the parietal and occipital bones,

caused me to inquire into the character of this invasion and to examine the literature of the subject. I was somewhat surprised at the paucity of the literature on this infection in connection with the temporal bone as a sequel to suppurative otitis. I found four cases reported under the title of osteo-myelitis of the temporal bone, all of which have been published since 1901. This does not include my own published case referred to above, as it was published under the title of "Three Cases Illustrating Cerebral Complications of Otitis Media Suppurativa." The existence of osteo-myelitis in this case was mentioned in the body of the paper as a complication which occurred in connection with the case. There is no doubt that other cases have been reported, as my first case was, under a title which gives no indication of the existence of the osteo-myelitis in the case, the collection of which would require a great deal of case searching and with a great cost in time spent. There is also no doubt that some cases have not been reported on account of the operator not appreciating the character of the invasion, believing the conditions to be no other than a typical case of mastoid empyæma.

There is no doubt, also, that cases have been lost, although reported, because they have been considered as severe types of mastoiditis running an atypical course, and in which the symptoms present and the pathological finds have not been given with sufficient definiteness to make the case clear. While taking up the consideration of this subject, I am not unaware of the fact that objection may be made to the use of the term osteo-myelitis as involving the temporal bone as a sequela of suppurative otitis as an unnecessary attempt to increase the nomenclature of this disease, and that this condition should be looked upon rather as a more severe type of suppurative mastoiditis. Such is not the case, however, as this case is clinically and anatomically entirely distinct from a typical mastoiditis; it immediately extends beyond the confines of the mastoid and is attended with profound general sepsis from the onset. As it extends rapidly through the medullary structure of the bone, not limited by sutural borders, and as it corresponds to all the symptoms of acute primary osteo-myelitis, it cannot have any other term.

CASE I.—This case was the one reported before the Section on Laryngology and Otology, at the fifty-first annual meeting of the American Medical Association, held at Atlantic City, June, 1900. The patient was a white farmer, twenty-five years of age, who had a mastoid abscess of about six weeks' duration. The mastoid swelling was intense and extended up nearly to the vertex of the skull, and well down below the tip of the mastoid; a great boggy mass of indurated tissue. He presented a typical typhoid condition, sallow skin, dry tongue. His temperature was 100.8° F. pulse 70, respiration 18. I must acknowledge that, at this time, I did not appreciate the character or gravity of this case. The patient was immediately operated upon. The incision was made through an extremely infiltrated colloid-like tissue, quite an inch in thickness; no perforation of outer table of mastoid. Cells found extensively destroyed, and freely curetted to apparent sound bone; tip of mastoid removed. Temperature and general condition showed slight improvement until the fifth day after the operation, when there was a chill, with a decided rise in temperature, 102.6°. On removal of the dressing, the small area of indurated tissue in the neck below the mastoid tip was found to have broken down. This abscess cavity was evacuated. It was noted at this time that while the induration towards the vertex of the skull had markedly diminished, yet the tenderness over this area, as well as in the temporal and occipital regions, was greater than before the operation. The temperature again dropped after this operation, although still showing a septic wave. The tenderness over the parietal, temporal, and occipital areas still continued without abatement. Ten days later, there was another chill, attended with a sudden rise in temperature, and with the formation of an indurated area in the anterior temporal region. On palpating and making pressure over the indurated area in the temporal region, it was discovered that there was a flow of pus into the mastoid osseous wound at the superior part, and it was noted that this did not flow between the temporal fascia and the periosteum, but into the depth of the mastoid wound itself, showing that there was a direct communication between the pus cavity in the temporal region and the mastoid cells; in other words, that the pus was formed entirely between the tables of these bones, and had caused a perforation of the outer table at the site of the abscess. An incision was carried back to the upper extremity of the mastoid wound, and the perforation of the outer table located. A probe inserted at this point could be readily carried up between





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the tables of the bone as high as the parietal eminence and back into the mastoid bony wound. The outer tables of the squamosa and the parietal bones were removed until healthy osseous tissue was reached, and the inner table thoroughly curetted on its outer surface. There was again an improvement, although the septic character of the invasion did not disappear. Ten days later, there was a similar abscess formation well back in the occipital region, which presented all the characters of the invasion in the temporal region, and which was treated in a similar manner. Seven days later there was another decided septic invasion, indicating thrombosis of the lateral sinus. This thrombosed sinus was subjected to operative intervention. The patient died sixteen days after the operation for sinus thrombosis of meningitis.

CASE 2.—On Friday, June 19, 1900, I was asked to see a patient in consultation who had developed a mastoid abscess within five days after the initial rupture of the left membrana tympani, which was secondary to an acute influenza. I quite agreed with Dr. Sterling Ruffin as to his diagnosis, after examining the patient. The patient was a young maiden of fourteen years of age, who had previously been under my care for a chronic suppurative otitis of the right ear. On examination of the left ear, I found a well marked and fairly large perforation in the posterior quadrant, with quite a free discharge of thin watery pus. Marked tenderness over mastoid, squamosa, and posterior to mastoid, already showing infiltration of overlying soft tissues. The general condition of the patient impressed me greatly. She appeared very ill. Her temperature had never been below 102° since the invasion of the middle ear, and had attained an elevation between 103° to 104° every evening. Her face was sallow, the tongue coated, and she had the appearance of an individual in the second week of typhoid. The pulse was soft and slightly compressible, about 110. Operation was considered necessary, but attempt at abortion was decided on for twenty-four hours, with the usual local and general treatment. The next morning, Dr. Ruffin telephoned me that, as the patient's condition had grown worse instead of better, he would remove her to the Columbian University Hospital, for the purpose of having the operation done. At noon, on June 21, the operation was done. On cutting through the infiltrated soft tissue and exposing the bone, the latter was found to have a bluish-gray appearance. On chiselling the bone, it was found to be very friable, and bled freely. There was no pus found in cells or at tip of mastoid. As

progress was made towards the antrum mastoideum, a few drops of pus were observed, and, on opening antrum, about five or ten drops more were encountered. The tip was removed, and the bone cut away above and posteriorly until apparently normal osseous tissue had been reached. The wound was dressed and the patient placed in bed. It will be observed from the chart that the temperature was 102° at 7:30 P.M. on June 20th, the day of admission to the hospital, and remained about the same until immediately after the operation, when it registered 98.4° . At eight o'clock of the same evening it registered 104° . I recognized the fact that I had a high degree of sepsis, but, feeling assured that I had removed the source of infection, I did not feel anxious as to my patient for the first two days after the operation, although the temperature and general condition showed no improvement. Frequent sponge and alcohol baths were employed, they always being attended with a drop in temperature from one-half to one degree. On the third day after the operation, as the temperature was higher, 104.3° , and the general evidence of sepsis more marked, I became extremely anxious as to my patient's welfare. The respirations were more rapid, 32; the pulse weaker and intermittent, 114; the tongue was dry, the lips parched and cracked, and there had developed a cough with profuse reddish-brown expectoration. The first dressing was made at 2:30 P.M. of this day. The packing was free from moisture, excepting in that portion of the dressing packed into the antrum. The cavity was cleansed and made ready for dressing. Before reapplying the dressing, I spent about five minutes carefully inspecting the well-cleansed and dried cavity for some possible clew to account for the maintenance of the sepsis. I was just about to replace the packing when I saw one pin-point yellowish glistening point deep in the wound, soon followed by several other similar points here and there disseminated over the osseous wound. These little points of pus grew larger, and, in about ten minutes, dropped down into the bottom of the cup-like mastoid wound. Only the lower portion of the wound was packed; the deep portion of the mastoid terminating in the antrum was covered only by superficial dressing. I saw now that the osteo-myelitis had extended beyond the confines of the area upon which I had operated, and recognized that quick action was necessary to save my patient. Three hours after the dressing, I again operated upon the patient. On removing the dressing, I found that the whole of the cup of

the wound had become filled with a thin grayish-yellow pus, amounting to about two teaspoonfuls, which had accumulated since the dressing. The wound was enlarged in the superior and posterior directions. The outer table of the squamosa was followed up to the parietal suture before healthy bone was encountered. Backward along the mastoid the diseased bone was followed into the parietal and occipital bone before healthy bone was here reached, requiring extensive exposure of the lateral sinus. Most of the cells forming the diploë of the bone were filled with pus. The exposed inner tables of bone were freely curetted. Although there were no constitutional evidences of septic phlebitis and the sigmoid sinus appeared perfectly normal in the portion exposed, I decided to open it, in order to eliminate this as a remote possibility of being a factor in the general sepsis. The exposure substantiated the diagnosis. The wound was dressed and the patient returned to her room. The general condition of the patient began to improve at once, and the temperature gradually and progressively assumed a lower place until the fifth day after the latter operation, when the patient had a slight chilly sensation, with slightly greater excursion of the temperature. At the dressing made on the above-mentioned day, June 29th, there was noted a marked redness of the face on the left side, as well as on the forehead. On July 2d, there was another slight chill, more marked than the former one, and, on examination of the patient, I found that there was an extension of the superficial erysipelas over the greater portion of the back, extending from the neck to the lower dorsal region. By July 3d, the erysipelas of the face had disappeared, and, by the 5th, nearly all of that on the back. On July 6th, the temperature assumed the normal and so continued. The wound remained perfectly healthy from the time of the performance of the second operation until it had completely granulated.

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TUBERCLE-LIKE BACILLI IN THE DISCHARGE OF CHRONIC PURULENT OTITIS.

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RECENTLY it has been demonstrated that bacilli exist which are quite similar to those found in tuberculosis, as far as morphology and coloring reaction are concerned. They can be differentiated by a peculiar growth on artificial media and by animal experimentation. These bacilli occur very frequently in milk and in commercial butter. They were discovered and their differentiation from the tubercle bacillus was described by Petri and others. They were also found present in infusions of several field herbs, and in the feces of herbivora, particularly in the feces of milk cows, who let fall the bacilli in the milk during the act of milking, united with little bits of feces that adhered to the skin.

In the same manner the presence of pathogenic acid-fast bacilli were ascertained in the most varied affections of the organism: in pulmonary gangrene, by Fränkel and others; in the oral cavity and in the dental coating, by Laabs, Rovida, and De Simoni; in simple bronchial catarrh, by Moeller and Lichtenstein; in syphilitic ulcerations of the mucous membrane of the nose, by Karlinski; in hypertrophic tonsillar crypts, by Marzinowski; in the intestinal contents, by Mironescu; and recently by myself in the discharge of ozæna and in the superficial layer of the tonsils.

The knowledge of these bacilli is important from a practical point of view. It is evident that the simple morpho-

logical examination of acid-resisting bacilli is no longer a sufficient evidence nor a proof of the tuberculous nature of a lesion, and does not invalidate the necessity of further researches, which will be sure to demonstrate the widespread occurrence of this tubercle-like bacillus. Acid-resisting bacilli are found in the discharge of purulent otitis; they are non-pathogenic and resemble bacilli found in milk and in bovine feces. They should not be confounded with the smegma bacillus, which cannot be cultivated on artificial media.

Though purulent otitis due to tuberculosis can generally be differentiated from the other varieties clinically, cases occur not infrequently where the diagnosis and a rational treatment are greatly aided by the finding of a specific bacillus in the discharge. Whenever we find acid-resisting bacilli in the discharge of purulent otitis, it becomes necessary to determine whether the bacilli are tuberculous or not.

My cases were those of a girl, nine years of age, daughter of well-to-do parents, and of a young farmer, twenty-six years of age, both healthy and without hereditary taint. The lesion in both cases was bilateral and dated back several years. According to the patients' statements, apparent cures were noticed at intervals, with occasional relapses and transitory but violent pain; periods of abundant discharge alternated with periods of scarcely any. No regular treatment had been followed.

On examination, after cleansing the auditory canal, the usual alterations in these cases were observed: a diffuse redness in the canal, perforation of membrana tympani in the inferior quadrants; the tympanic mucous membrane red with flabby granulations. In both cases hearing was slightly diminished.

The microscopic examination of the pus stained with carbolfuchsin or Löffler's methylene blue, revealed a very large quantity of germs: very many cocci, single or in groups, of various sizes; long, slender bacilli, or short and thick ones, not definable; capsulated diplococci; many pus corpuscles, some phagocytes showing fatty granular degeneration. In the specimens stained for tubercle bacilli, a great number of

long, slender bacilli were present; they were grouped together, intensely colored red, and gave at first the impression of being tubercle bacilli. These bacilli, however, were longer, their protoplasm was greater in quantity and more homogeneous. This, taken in connection with the chronicity of the lesion and the absence of complications, left no doubt that they were not tubercle bacilli. These were, therefore, bacilli belonging to the acid-fast group, destitute of virulence and toxic qualities.

A bacillus cultivated from the first case presented the following characteristics:

Morphology. Reaction to Stains.—It is a straight bacillus or only slightly curved, with pointed ends, rather long and slender, a little longer and more slender than the common tubercle bacillus, particularly in liquid media and in recent cultures. They are stained with the ordinary aniline dyes, quite like tubercle bacilli, and are not discolorized by Gram.

Growth.—This bacillus develops well enough at room temperature (18° – 20° C.); better, however, in the thermostat, at 35° – 38° C.; it is immobile, facultative aërobic; not gas forming; not developing spores. On agar after thirty-six to forty-eight hours in the thermostat, small superficial colonies are formed, rounded, slender, very slightly elevated, and of whitish color. Under the low power the colonies show clear contents with darker central nucleus and finely fringed margins; and after five or six days in the thermostat they turn a pale rose color, become irregular in form with a wrinkled and nodular surface. In agar slant tubes, after forty-eight hours in the thermostat, a dry, pasty, circumscribed, and slightly elevated growth, with irregular margins, appears; after five to six days it becomes diffused, somewhat thicker, of a decidedly rose color, with an irregular and wrinkled surface. It does not liquefy gelatine. In stabs a rose-colored growth appears on the surface; along the stab a slender, granular, pale, rose-colored growth ensues. Broth is not clouded; a granular deposit appears in the bottom of the tube. On the surface of the broth there is formed a fine, transparent rose-colored pellicle which spreads on the walls of the tube. In milk it grows readily without causing

coagulation. On the potato it develops into a dry, pasty, circumscribed growth, of the same color and irregular surface. It is non-pathogenic. Guinea-pigs and rabbits inoculated with one or two *ccm* of a fresh culture in broth subcutaneously in the abdominal cavity, or directly in the circulatory channel, suffered no ill effects. Old cultures of twenty days remain also inactive. Animals examined at variable periods from the time of inoculation presented no lesions in the internal organs. The bacillus cultivated from the second case presented, in the main, the same features.

We see that this organism, beyond some morphological similarity and an acid-resisting property, does not resemble the tubercle bacillus. The occurrence of these acid-fast bacilli in purulent otitis has not been previously noted. It is a further proof of the universal growth of this bacillus, and shows that we should not be too hasty in diagnosticating the tuberculous nature of a purulent otitis media from the presence of bacilli that resist acids.

CONTRIBUTION ON OTOGENOUS DISEASES OF THE BRAIN, MENINGES, AND VENOUS SINUSES.

BY DR. SUCKSTORFF AND DR. HENRICI, ROSTOCK.

Translated by Dr. ARNOLD KNAPP.

(Continued from page 461, Vol. XXXI., of these ARCHIVES.)

(With temperature chart on Tables III. and IV. from Vol. XLIV., *Zeitschrift für Ohrenheilkunde*.)

Case 54.—Sinus phlebitis and septic pyæmia following acute mastoiditis. Several operations. Recovery. (Temperature chart.)

E. K., seventeen years of age, a servant girl, applied for treatment on April 27, 1902, on account of right-sided acute purulent otitis.

The canal contained a large quantity of pus, the *Mt* was very red but not bulging, a perforation down and below. The mastoid process and tragus were sensitive to pressure. On May 23d this had increased. There was a distinct swelling of the periosteum over the mastoid process, and as the discharge had not diminished the patient was admitted to the clinic.

Operation, May 24th.—Periosteum was found somewhat thickened, there were some hemorrhagic points, and some small beads of granulation tissue in the mastoid fossa; the cortex was very thick; there were some small cavities filled with pale granulations, and a somewhat deeper and larger cavity containing granulations. The wound was partially sutured.

Subsequently a swelling developed under the mastoid process. Temperature went up to 40.2°. Severe pain was experienced over the region of the squama. The patient was dizzy on sitting up, no vomiting, no signs of paralysis, no rigidity of neck. Ocular movements normal. Pulse 120, strong, and regular.

Second Operation, June 4th.—The incision was prolonged back-

wards, the bony cavity enlarged, more pneumatic cells containing pus and granulations were exposed. These were found to extend backward to the sinus. The sinus wall was thickened, grayish-white. On exposing the sinus an unusually large emissary vein was ruptured. Severe hemorrhage necessitated packing and interruption of the operation. The headache continued, the fever did not decrease, the right eye was somewhat prominent but otherwise normal.

June 5th.—In the afternoon a sudden fall of temperature, with relief of the headache. On the following day the patient vomited; on June 7th the temperature rose to 39.6° , pulse 100–115, moderate headache. The protrusion of the eye had again disappeared. On June 10th the temperature rose in the afternoon to 40.6° , with slight chill and headache.

That evening, at six o'clock, the *third operation* was undertaken. The incision was prolonged backward, the sigmoid and transverse sinuses were exposed in both directions. The sinus wall was discolored and felt hard. In the horizontal portion the discoloration ceased, and the puncture behind this showed fluid blood. Pulsation of the brain could be felt at the thrombosed portion. The jugular vein was then ligated, after a number of glands had been removed. The vein was found collapsed, empty from the junction with the facial vein upwards. The double ligation was performed directly above the junction with the common facial vein. The sigmoid sinus was then incised, a soft grayish-red thrombus removed from both directions, followed by profuse hemorrhage. The wound was packed. After the operation, repeated vomiting.

The patient did very well. On June 15th the temperature rose again to 39.3° , with moderate pain during swallowing. On June 17th, temperature in the afternoon rose to 40.6° . The sinus was then exposed farther backwards, up to a point where it presented its normal blue color. In this newly exposed region the sinus was found to be thrombosed and yellowish. The masses were evacuated and hemorrhage followed. On the following day the temperature again rose, with a chill, to 40.5° . Subsequently no fever until June 25th, when, after a severe chill, the temperature was 40.5° . There was nothing to account for this, no headache, no pulmonary symptoms. The temperature subsequently remained normal. The wound was healed on July 31st.

The patient was seen again in November. The wound was dry and the hearing was almost normal.

Remarks.—The anticipated sinus resection was delayed on account of the profuse hemorrhage from the emissary vein. Not until six days afterward could the packing be removed from the bleeding point and the operation completed. Even then, re-formation of a thrombus farther backward was not prevented and necessitated another evacuation. The ligation of the jugular vein was without influence on the course of the disease, as the vessel was empty.

The septic-pyæmic infection is still unexplained. The body either required a rather long time to overcome the primary infection, or septic material from the secondary thrombus was conveyed to the junction of the sinuses at the torcular, and from there entered the general circulation along the other side.

The absence of changes in the eye-grounds was not unusual, agreeing in this with our experience, that sinus phlebitis usually runs its course without such changes. The transitory protrusion of the right eye remained unexplained.

Case 55.—**Abscess of the temporal lobe in the course of chronic middle-ear suppuration, with polypi and destruction of the tegmen antri. Operation. Death, probably from progressive encephalitic meningitis.**

J. K., thirty-one years old, wife of laborer.

Previous History.—Otorrhœa in childhood, without any discharge for ten years. In July of this year, after slight pain in the right ear the discharge reappeared. After several weeks it ceased, reappearing in November and causing the patient to apply at our clinic on November 14th.

The right canal was occluded with polypi and pus; several polypi were removed with the snare. The canal was then found to be narrowed by a hyperostosis. With a small probe epidermal masses and pus could be extracted from the depth. A distinct picture of the tympanic conditions was not obtained. There were no headaches and no vertigo; the eye-grounds were normal. The patient refused to enter the hospital, and returned home.

On November 23d, she was brought to the hospital in an unconscious condition. On the day following her last visit to the dispensary, pain in the right ear and vertigo set in. The patient went to bed; she had fever and vomited. On November 20th

she became unconscious and has remained so. During the last days her husband noticed that the left arm and leg were not moved.

On admission, November 23d, a well-nourished woman, unconscious; reacts slightly to needle pricks, and only moves the right arm. If both arms are raised and moved about, a slight rigidity in the left arm is noticeable, and on letting go the left falls quicker than the right. There is no labial herpes, no facial paralysis, no rigidity of the neck. The corneal reflexes are present, the pupils are even, react promptly; the eye-grounds are normal; the patellar reflexes are normal. The cutaneous sensibility in the face and in the left half of the thorax is somewhat diminished. The right mastoid process is apparently normal. The right canal contains a great deal of pus, but no sagging of the wall. The urine is normal; temperature 38.8° ; pulse 132, and regular. Leucocyte count showed 12,000.

Clinical Diagnosis.—Chronic purulent otitis, with polypi and intracranial complication, probably abscess in the right temporal lobe.

Operation was immediately undertaken, at first under chloroform, later without any narcosis. The right auricle was detached according to Stacke. The soft parts and the periosteum were thickened, the bone very sclerosed. At a slight depth the dura of the middle cranial fossa and the sinus were exposed. Both appeared healthy. On proceeding in the direction of the antrum, the dura of the middle cranial fossa was again encountered, and the entire roof of the antrum was found wanting. The dura in this region was covered with granulations which hung down into the antrum. The antrum contained several sequestra, granulations, and epidermis scales. The tympanum contained granulations and epidermal masses but no ossicles. The antrum and the tympanum were freely exposed, then the opening into the middle cranial cavity was enlarged in the direction of the squama. The entire tegmen tympani was removed. Palpation of the exposed dura showed slight pulsation. The wound cavity was cleansed with 1:1000 sublimate solution; the dura was incised through the granulations in the region of the roof of the tympanum; at a depth of about 2cm pure pus appeared. The incision of the dura and of the external abscess wall was continued outwards to the outer surface of the temporal lobe. Some more purulent masses were evacuated, especially on holding the margins of the wound

open. On palpating and inspecting the abscess it seemed almost as large as a child's fist, apparently with very few depressions and surrounded by a firm membrane. The pulse dropped from 128 to 90 and then again rose to 110-120. A drainage tube was introduced into the abscess cavity and was surrounded by iodoform gauze.

After the operation the patient became conscious and answered questions. She apparently suffers a great deal from thirst. Temperature had fallen to 37.4°.

Nov. 24th.—Temperature 36.5°; pulse 84, uniform and strong. Patient remains conscious; answers correctly, though slowly; does not complain of pain, but of great thirst. Extremities on both sides can be easily moved. There is no disturbance of the eyes; right—slight ptosis, pupils uniformly wide. In the face, the left half appears a little anæsthetic. That evening the drainage tube was shortened. The wound presented nothing unusual. The discharge from the abscess cavity was only moderate. After the dressing the patient appeared somewhat stuporous; no movement of the bowels.

Nov. 25th.—Temperature 36.3°; pulse 72, strong and uniform. Pain in the right half of the head, unquenchable thirst; answers questions slowly, though correctly; right—slight ptosis, ocular movements normal. During the dressing, after removing the drainage tube thin fluid pus was evacuated. The cavity was dipped out and the drainage tube re-inserted. The bowels moved after castor oil. Quantity of urine passed in the last twenty-four hours, 1200 *ccm*, no sugar.

Nov. 26th.—The patient appears languid and sleepy, is roused with difficulty; answers, however, correctly. The ophthalmoscopic examination revealed slight blurring of the disc margins. Leucocyte count 17,000. Urine 1400 *ccm*. Temperature 36.6°, pulse 90.

Nov. 27th.—Temperature 36.9°, pulse 70. The wound is apparently doing well. There was some thin fluid pus escaping from the abscess cavity, which is apparently 3 *cm* deep. The patient appears to be somewhat brighter, appetite is better and thirst is less.

Nov. 28th.—Temperature 36°, pulse 72. Moderate pain in the right side. Patient is continually gaping. In the evening the temperature began to rise, the patient became more sleepy and could be roused only with difficulty. Sudden collapse at ten in

the evening, pulse rose to 160, right half of head and chest became very red, and death ensued.

An autopsy could not be obtained. On investigating the vicinity of the wound, we found the dura and pia very anæmic. The pia was smooth and glistening, the gyri flattened, the sulci obliterated, the brain substance in the parts surrounding the abscess softened.

Remarks.—A large abscess with a membrane in the temporal lobe was evidently present nine days before its evacuation, at the time when the polypi were removed from the ear. The rigidity in the paretic arm speaks for simultaneous meningeal irritation; and the psychic condition of the patient after the evacuation of the abscess, for an extensive lesion of the cerebrum. If, in addition, we take into regard the exploration of the pus cavity and its surrounding parts after death, it seems probable that at the time of the operation—as is so frequent in such cases—progressive encephalitis was present about the abscess. The diagnostic value of the leucocyte count in this and similar cases is a subject to which we will subsequently return.

Case 56.—Deep-seated extradural abscess in the posterior cranial fossa, cerebellar abscess, obliteration of the transverse sinus with purulent meningitis after chronic purulent otitis; opening of the antrum and evacuation of the extradural abscess. Death. Autopsy-report.

K. L., laborer, thirty-one years old, was admitted on September 15, 1902. He had previously been in good health. For three weeks patient suffered from headache. On September 9th he had not been well and had stayed in bed for two and a half days. On the 13th of that month he again went to bed and became stuporous; complained of headache. The left ear is supposed to have discharged for an indefinite length of time.

On admission the patient was languid, scarcely reacted to questions. The left corner of the mouth hung down, the naso-labial groove obliterated, slight left ptosis; the abdomen is retracted. The left patellar reflex preserved, the right cannot be demonstrated; the right cremaster reflex distinct, the left not present. Abdominal reflexes on both sides are present, Kernig's contracture, distinct rigidity of the neck. The extremities can all be moved.

The left canal contains pus of slightly fetid odor, with debris and epidermis scales. The *Mt* is absent; a polyp hangs down from above and back; the coverings of the mastoid process appear normal; the tip of the nose and the lips present herpes.

Condition of the Eyes.—Pupils are uniform; papillæ are very hyperæmic, the limits somewhat ill-defined.

Lumbar puncture was performed. This was made difficult on account of the position of the vertebral column and the muscular rigidity on both sides. Only a few drops of lumbar fluid, together with some blood, were obtained. The fluid showed numerous leucocytes and red blood corpuscles, in the combination of about 1-15 to 1-20.

Operation.—The mastoid process was sclerosed, the antrum was small and contained discolored granulations; in its vicinity the bone appeared hyperæmic and softened. The dura of the middle and posterior fossæ was exposed. The dura was hyperæmic and lustreless. A few small granulations were on the sinus wall. A drop of pus to the inner side of the sigmoid sinus came from a fistula, which was followed and led to a deep-seated extradural abscess in the posterior fossa, whose dural wall was discolored. The temporal lobe and cerebellum appeared tense; pulsation was not marked. Puncture in both directions was negative.

Bacteriological examination of the lumbar fluid showed leucocytes and isolated diplococci, which, however, were not distinctly intracellular. The culture after fourteen hours was sterile. Another culture showed a growth of cocci which in size resembled the diplococcus of Weichselbaum or the streptococcus intracellularis meningitidis of Jäger. Bacteriological examination of the pus from the extradural abscess was negative.

Nov. 16th.—The sensorium as before the operation; occasionally marked motor unrest. Patellar reflexes absent, no paralysis, sensation not affected. Dermographia; left eyelids can be closed, though their motility is somewhat restricted. The patient passes urine involuntarily. Pulse, 114; temperature, 38.7°.

Nov. 17th.—The condition in general about the same, the changes in the eye-grounds more marked; pulse, 134.

Nov. 18th.—The motor excitement more marked, the sensorium perhaps less affected, facial paralysis more marked, the left eye cannot be closed. Pulse, 116; temperature, 38.8°.

Nov. 19th.—Greater restlessness. Horizontal nystagmus on looking to the right. Pulse, 130; temperature, 39.4°.

Nov. 20th.—Sensorium affected, more rigidity of neck, marked restlessness. Pulse, 126; temperature, 38.8°.

Nov. 21st.—Opisthotonos. Slight left-sided abducens paralysis. Pulse, 148; temperature, 40°.

Nov. 22d.—Pulse gradually failed, and with a continuance of the same symptoms the patient died.

Autopsy-Report.—Dura very hyperæmic; also the pia of the convexity; the gyri are flattened, the venous sinuses contain post-mortem clots; purulent exudate at the base of the brain about the chiasm and clivus and on both sides at the base of the cerebellum. This extends to the cauda equina; isolated purulent deposits, especially about the left Sylvian fossa; the lateral ventricle contains purulent fluid. The dura over the tegmen tympani is apparently unchanged. On the posterior surface of the petrous bone the dura corresponding to the cavity of the operation is covered with pus. In this locality an abscess as large as a hazel nut is found in the left cerebellar lobe, surrounded by a membrane several *mm* in thickness. No direct communication between this abscess and the extradural collection can be demonstrated. The left transverse sinus is in its entire sigmoid course obliterated and converted into a connective-tissue band. The temporal bone was removed, and on examination of the tympanum the facial nerve was found exposed for a long part of its course. The ossicles, including the stapes, are absent. The region of the oval window is obliterated by fibrous scar tissue. In the semi-circular canals there is no pus, nor in the internal porus acusticus.

Remarks.—The previous history of the patient was uncertain, and, owing to the stupor of the patient, could only be obtained from his master. The course of the disease, however, is probably as follows:

In connection with an old chronic otorrhœa, which had led to the loss of all the ossicles and fibrous obliteration of the oval window, an apparently latent sinus thrombosis had led to the obliteration of the sinus. This complete conversion of the sinus into a solid connective-tissue band probably occurred a long time ago; the meningitis and the cerebellar abscess, of course, are of recent date. The deep-seated extradural abscess in the posterior cranial fossa evidently appeared first. This was directly followed by an abscess in the adjoining part of the cerebellum.

The cerebellar abscess, according to the history, had existed for three weeks at least. The thickness of the abscess membrane would not contradict the presence of an abscess of that duration. On September 13th a diffuse meningitis set in with violent symptoms, secondary to the cerebellar or extradural abscess.

The facial paralysis was due either to pressure of the meningeal exudate on the nerve at the base of the skull or to destruction of the facial canal in the tympanum. The cortical lesion could not have produced the paralysis, as the meningeal exudate in the region of the sulcus of Rolando on the opposite side was not marked. The internal auditory meatus was free from pus.

The tenseness of the brain in the middle cranial cavity was unusual. The brain substance prolapsed through an incision of the dura 1 cm in length. One could have suspected an abscess or a ventricular hydrocephalus. This tenseness, however, was produced by a general hyperæmia of the meninges, which had led to a flattening of the cerebellar convolutions. The ocular changes are not unusual, as they are almost always present in a combination of intracranial otitic changes, and are generally absent in the presence of only one lesion.

The lumbar puncture was made very difficult in this case on account of the marked opisthotonos. The spinous processes were forced so closely together that their palpation was made very difficult.

Though the result of the first lumbar puncture showed that an operative intervention offered slight prospect for success, we nevertheless operated, as cases are well known where cerebral abscess and not purulent lepto-meningitis was present, with slightly cloudy lumbar fluid, with a few leucocytes and rigidity of neck.

Case 57.—Large extradural abscess in the middle cranial fossa, necrotic destruction of the dura, purulent exudate in the subdural arachnoid spaces of an unusual, disseminated distribution, following chronic purulent otitis; with autopsy-report.

C. B., seventeen years old; left-sided otorrhœa since childhood. Two days ago his parents received a postal card from him with in-

comprehensible contents. On the advice of their physician they took him on October 15, 1902, to the Ear Clinic. The patient was somewhat somnolent and unclear in his head and had been in bed for a number of days.

On admission—a well-built man, with a pale face, replying "Yes" to all questions, slight somnolence, swaying on standing or walking, no distinct rigidity of the neck, no paralysis of the extremities or of the facial nerves. Patellar reflexes present, abdominal reflex absent, no Kernig's flexion contracture. Pupils are equal in size and react promptly, the eye-grounds show tortuous and congested veins, the nasal half of the disc is somewhat swollen. Pulse, 102; temperature, 40.1°.

Pus in the left auditory canal, a perforation in the posterior quadrant filled with epithelial masses. The rest of the drum is red and thickened; no bulging. Coverings of the mastoid process are normal, slightly tender in the mastoid fossa; the right ear normal.

Operation.—Incision according to Stacke. The antrum was exposed, the mastoid process proved to be sclerosed. After exposing the antrum, a thin, dark green fluid with purulent flocculi and gas suddenly escaped from the upper and external margin of the bony cavity, apparently coming from the middle cranial fossa. The incision is prolonged upwards and backwards, the middle cranial fossa is exposed from the tegmen antrum to the region of the squama. A part of the temporal squama, and a small part of the parietal bone, are removed. In the middle of this exposed region the dura is found destroyed, and the brain covered with clouded and reddened pia prolapsed to the size of a hazel-nut. The exposed dura is greenish-yellow; in the direction of the floor of the middle cranial fossa it is covered with healthy appearing granulations. On elevating the dura from the margins of the bony defect no more pus appears. The sinus is not exposed, the antrum contains cheesy masses. The tympanum is then exposed, the hammer extracted. The prolapsed brain is punctured, without any result. The exposed dura pulsates and is apparently under considerable pressure.

The pus presented coli-like bacilli. Toward evening the neck became distinctly rigid. The patient continued to be somnolent, passed urine involuntarily. Pulse, 110; temperature, 40.3°. During the night a sudden chill.

Oct. 16th.—Is more stuporous, the neck is very rigid, the right

arm is paralyzed, the right leg is not paretic, the patellar reflexes are absent, as well as Kernig's flexion contracture.

Operation.—Slight left-sided ptosis, the eye-grounds as yesterday, the congestion of the vessels in the left eye somewhat more marked. Repeated chills during the afternoon and evening; patient is able to swallow well. Pulse, 120–138; temperature, 40.3°–41.2°.

Oct. 17th.—Restless night, completely unconscious, râles, Cheyne-Stokes respiration, pulse 156, temperature 40.2°; death in the morning.

Autopsy confirmed that the infection of the interior of the skull had extended from the middle ear through the diseased tegmen antri. The extradural abscess had evidently first been formed, had extended along the floor of the middle cranial fossa between the dura and the temporal lobe, and had perforated the dura on the lateral surface of the temporal lobe. After the evacuation of the abscess and exposure of the diseased dura, a small part of the temporal lobe protruded through the opening in the dura. At this point the infection led to a purulent accumulation in the arachnoid and subdural regions. At the base of the brain, corresponding to the arachnoid suppuration, a plastic exudate was found in the subdural space adherent to the inner surface of the dura. On the side of the diseased ear with its extradural abscess, no subdural and no arachnoid suppuration was present, while on the opposite side both conditions were present at the lower surface of the temporal lobe. The sinus contained fluid blood and post-mortem clots. Where the exudates were absent the pia contained a moderate amount of blood and was transparent, without œdema. The ventricles contained neither increased nor very cloudy fluid; the convolutions were somewhat flattened. The cerebellum and cerebrum contained about the usual amount of blood. The surfaces of the incision were somewhat moist and quite firm. The left internal auditory meatus contained no pus. The right ear was also healthy. The spinal canal showed no pus.

Remarks.—This case was operated because on admission no symptoms existed which were indicative of a meningitis, while the possibility of a brain abscess was evident. The certain signs of a meningitis appeared after the operation. The lumbar puncture, which we did not perform, would

probably not have given us a fluid containing much pus, on account of the tenacious plastic exudates.

Case 58.—A large perisinuous abscess after chronic middle-ear suppuration after otitis; operative evacuation; spontaneous rupture of the transverse sinus; optic neuritis increasing after operation; recovery.

M. K., twenty years old, was admitted October 16, 1902. It was impossible to obtain any history from the patient. She is able to walk only when supported on either side. A tendency to fall to one side is not apparent. She is in considerable collapse—cold perspiration; small pulse, over 100 and regular; sensorium clouded. The patient does not react; on probing the tympanum, complains of no pain. The tongue is dry, coated, as well as the lips, the teeth, and the gums; no paralysis; reflexes present.

The right mastoid process is very tender. In the mastoid fossa the coverings are distinctly swollen, the swelling extending posteriorly and below the mastoid process. In the retro-maxillary fossa there is a well-marked swelling (glandular); the cervical veins show no abnormality. The right ear-canal contains thick pus, without odor. After cleansing there is no sagging of the upper wall. The *Mt* and ossicles are destroyed. From the posterior part of the attic a polyp protrudes. Eye-grounds: pupils normal, react promptly; the discs are prominent, with ill-defined margins. The discs are of a dirty yellowish-gray, red in the centre; the vessels are congested and tortuous; there are no hemorrhages. The conditions on the right and left side are the same. The left ear is normal. Temperature 39°, leucocyte count 1400.

Operation.—Vertical incision $\frac{1}{2}$ cm behind the auricle, in the middle, prolonged backwards. On the first incision, a small quantity of pus escapes. The coverings are infiltrated, the periosteum is thickened, of a grayish-red except in the region of the well-preserved masto-squamosal fissure. In the upper part of this there is a perforation with granulations. The mastoid process is exposed first at the tip. No pus is found; then, proceeding upwards behind the masto-squamosal fissure, a number of small cavities in the sclerosed bone are exposed. On the second blow of the chisel a spurt of pure pus $\frac{1}{4}$ cm high appears, immediately followed by a still higher spurt of dark blood. The chisel could surely not have entered the sinus, as the first spurt was composed of pure pus and evidently came from a suddenly evacuated perisinuous abscess. Unquestionably the diseased sinus-wall ruptured

upon the sudden diminution of the pressure. The hemorrhage is stopped with packing; operation concluded; lumbar puncture. From the canula no fluid escaped, but alongside of the needle a clear fluid containing some blood but no leucocytes escaped.

After the Operation.—The patient came to, appears very much improved, reacts readily, answers all questions, and smiles. Pulse rate has dropped from 102 to 60; temperature from 39.1° to 38°.

Oct. 17th.—The general condition continues good, the tongue is no longer coated; temperature 36.3°, pulse 68, leucocyte count 7,200.

Oct. 18th.—Conditions are the same. Patient complains of slight pain in the right ear. On examining the eyes the discs are distinctly prominent—1 D. The periphery of the swelling is somewhat pale.

Oct. 20th.—The patient is not as cheerful as on the day previous. Complains of some pain in the right ear. Temperature in the evening 37.4°. The compressing gauze tampon was removed from the region of the sinus without being followed by hemorrhage. In the small abscess opening in the bone there is a pulsating drop of pus coming from a small cavity. On examining the eyes the margins of the discs appear to be more ill-defined and the swelling more discolored, the right disc more prominent than the left.

Oct. 22d.—The general condition good. Temperature 37.1°, pulse 60–78. In the abscess cavity some thin pus; the exposed bone is unusually pale.

Oct. 25th.—Condition is better, temperature 37.4°; pulse is slow, 56, regular, and of good quality.

The Operation is Completed.—Horizontal incision is made from the upper part of the vertical incision to the temporal fascia, the auricle is retracted downward, and the upper posterior margin of the external auditory canal is exposed. Internally to the supra-meatal spine the bone is rough. The bone between the canal and the cavity made at the last operation is removed, and on enlarging the bony canal in a posterior and upward direction we attempted to reach the antrum. This is very difficult, because the sinus is unusually displaced outwards and forwards. The middle cranial fossa is very deeply placed, the dura of this fossa is enlarged. Conditions in the posterior cranial fossa are as follows: The portion corresponding to the cavity made at the last operation is covered with granulations which pulsate, and some pus exudes.

On careful examination the granulations are found to be situated on the sigmoid flexure of the transverse sinus. Towards the inner side the bone from the antrum to the cerebellar dura is affected. Behind the sigmoid flexure the dura is covered with healthy granulations and no more pus is encountered. The antrum and tympanum contain granulations and epithelial scales. In the midst of the granulations there is a sequestrum; a part of the hammer alone remains. An inverted Stacke flap is formed, which is pressed upwards against the temporal muscle. The posterior wound is kept open.

Oct. 27th.—The patient complained of considerable pain in the wound. The dressings are changed. The wound looks healthy. Temperature 37° , pulse 58. The left optic disc is somewhat prominent, the right is going into a choked disc. The margins are indistinct, the disc itself is prominent, and the vessels show a distinct bend.

Oct. 29th.—Condition good. Pulse very slow but of good volume, between 50 and 60; no fever; on changing the dressing there is moderate discharge from behind the ear.

Oct. 31st.—General condition good. Pulse unusually slow, 42–48. On changing the dressing the condition of the wound is unchanged. The eyes reveal a marked condition of choked disc, the right swelling 4 D., the left 3 D.; the vessels moderately tortuous, no hemorrhages.

Nov. 21st.—The patient gets up; the gait is somewhat unsteady; no vertigo and no ataxia; pulse increased to 100.

Nov. 8th.—The condition continues to improve, the wound is healing rapidly. Pulse on being up, 80–90, on lying down, 50; it is always strong and regular. It appears that the slow pulse of the patient is peculiar to her, and is not produced by any pathological process.

Nov. 17th.—The conditions are the same. In addition to the choked discs there are numerous hemorrhages.

Nov. 23d.—The swelling of the discs appears to be diminishing, the margins are very indistinct, the venous congestion less marked.

Nov. 30th.—The swelling was measured, and proved to be in the right 3 D. and in the left 2 D.; no new hemorrhages; vision in both eyes normal.

Remarks.—Sudden evacuation of the large perisinuous abscess under considerable pressure was followed by the

rupture of the diseased sinus-wall. The necessary compressive bandage may have subsequently induced a thrombus, which may explain the increase in the optic neuritis following after operation. This case, as well as a number of others which we have previously observed, demonstrates that a post-operative increase of the optic neuritis does not necessarily give a bad prognosis.

Case 59.—Perisinuous abscess in acute mastoiditis; operation; recovery.

P. W., three and one-half years old. The boy had always been well. In the night of November 6th sudden pain in the right ear, followed by discharge on the following morning. On the fifteenth and twenty-first repeated vomiting. Admission on November 22d.

The boy is well nourished, no fever, eye-grounds normal. The right ear-canal contains muco-pus; no sagging of the walls; the drum is reddened and thickened.

A perforation exists in the posterior and inferior quadrant, occluded by the swelling of the tympanic mucous membrane; above and backwards is apparent bulging. Paracentesis reveals blood and some pus. The mastoid process is everywhere sensitive to pressure and slightly swollen; the skin over the thickened periosteum is easily moved.

Nov. 25th.—The local conditions in the mastoid have increased, the vomiting has not been repeated.

Operation, Nov. 25, 1902.—A vertical incision $\frac{1}{4}$ cm behind the auricle. Periosteum thickened; a number of small glands; the cortex presents a number of blood points in the mastoid fossa; in the posterior upper half it is blue in color. The bone is removed in the fossa; it appears hyperæmic but not softened. At a depth of $\frac{1}{4}$ cm a fistula was encountered, coming from the back and containing pulsating pus. The bone in the region of the antrum is softened. The antrum is enlarged with a sharp spoon; the cutaneous incision is prolonged backwards, the fistulous tract is exposed. More pus is evacuated, which comes from the sigmoid fossa, where the sinus has been separated from the bone by the purulent accumulation. This accumulation extends down to nearly the region of the bulb. The sinus is grayish-red and feels hard, but transmits brain pulsation. The surrounding bone is removed. Iodoform gauze packing.

Dec. 8th.—Subsequent recovery has been uneventful; the wound

behind the ear is healing nicely; there is still some discharge from the middle ear.

Dec. 18th.—Discharge from the middle ear is slight. On Jan. 22, 1903, the perforation in the upper and posterior quadrant is very small. The ear is usually dry, though during a coryza a slight amount of muco-pus is discharged.

Case 60.—Perisinuous abscess in acute mastoiditis; operation; recovery.

A. H., aged thirty-four, on July 26, 1902, experienced pain in the right ear. The drum perforated on the 30th. Gradual loss of strength; on August 28th, vertigo, especially on turning the head to the right; the otorrhœa continued in the same amount as at the beginning. Pain in the right temporal region.

On admission, September 1st, patient is unusually pale and apathetic; the right ear-canal contains a quantity of pus; the upper and posterior walls are sagging; the mastoid coverings are swollen and tender, especially in the region of the mastoid fossa and along the anterior margin. In the right ear the hearing is very much diminished. Objectively no vertigo. Eye-grounds normal. Temperature 37°.

Operation.—Underneath a thin cortex a sequestrum was found in the mastoid cavity filled with hypertrophic granulations; the antrum contained granulations. Perforation into the auditory canal and into the posterior cranial cavity, where a teaspoonful of pus was evacuated. Subsequent course uneventful.

Case 61.—Perisinuous abscess in a Bezold mastoiditis in a child aged ten; operation; recovery.

E. A., ten years old, suffered from a running ear on the right side for three weeks. Swelling has existed behind the ear for five days. On admission, June 4, 1902, a swelling on the right mastoid process and below the upper third of the sterno-mastoid muscle is present. The head is held rigid. There is pus in the canal. In the middle of the canal, in the upper and posterior wall, there are some granulations. Eye-grounds normal. Temperature slightly over normal.

Operation, June 4th.—Mastoid cells contain swollen mucous membrane and pus. Perforation has taken place into the canal, into the digastric fossa, and into the posterior cranial fossa; the

sigmoid sinus is covered with bluish-red granulations and separated from the bone by a collection of pus. Subsequent course not eventful.

Remarks.—The only unusual feature of this case is the appearance of a Bezold mastoiditis in a child.

Case 62.—Perisinuous abscess after subacute mastoiditis; operation; recovery.

B. W., eleven years old, was admitted on July 3, 1902. The attendant states that a swelling has existed behind the left ear since yesterday. The duration of the existing otorrhœa cannot be ascertained.

On admission, a poorly-nourished boy; sensorium free; no vertigo; the left auricle is prominent and pushed forward and downward by a swelling on the mastoid process. The swelling extends backwards beyond the margins of the mastoid process. It is very tender. The auditory canal presents a sagging of the posterior and upper wall, beginning quite far externally. After removal of the fetid pus, only the lower and anterior half of the drum is visible and presents a pulsating light reflex. Eye-grounds normal; temperature 38°.

Operation.—Incision evacuates a subperiosteal abscess which had extended anteriorly over the temporal line to the root of the zygomatic arch. Hemorrhagic points in the mastoid fossa. On probing the posterior and upper margin of the bony ear-canal the bone is found to be rough, but there is no fistula. The first blow of the chisel evacuates pus, which appears in a large quantity and pulsates. Entering the cortex the bone is everywhere softened, extending to the antrum, which is unusually enlarged externally and downwards. The antrum contains granulations, cheesy pus, and bone debris. The softened bone is thoroughly curetted. On removing the cortex posteriorly some more pulsating pus is evacuated, coming from the region of the sinus. The sinus is exposed up to the bulb. The sinus is unusually prominent, slightly pulsating, somewhat hard, is bluish-red, and in places covered with granulations and a fibrous membrane. A puncture with the needle reveals fluid blood. Subsequent recovery uneventful.

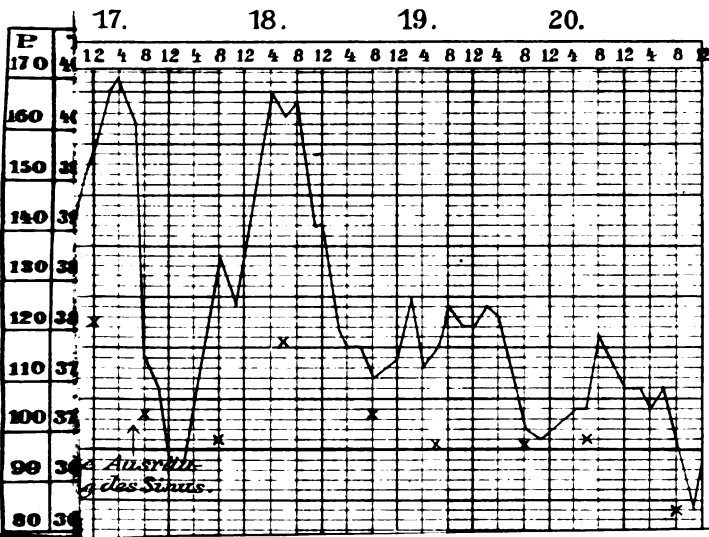
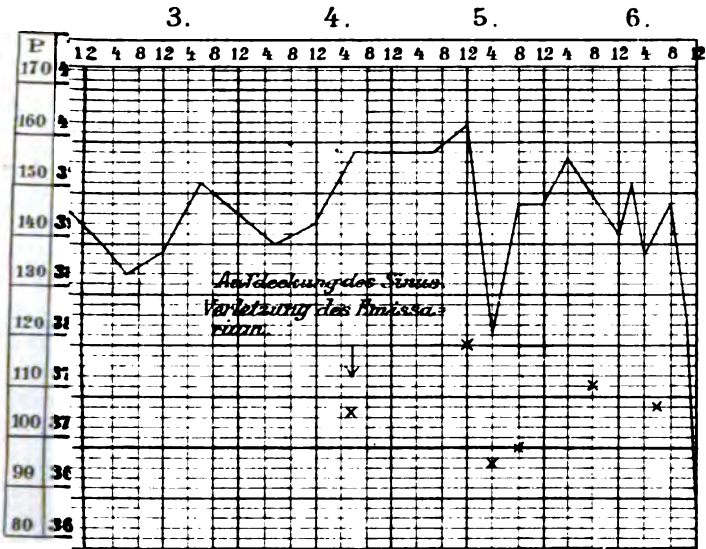
Aug. 26th.—The wound behind the ear is almost closed and the conditions in the tympanum have healed, though a somewhat large marginal perforation remains at the upper and posterior quadrant.

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Case 63.—Mastoiditis with perisinuous abscess after acute otitis; operation; recovery.

H. W., twenty-four and one-half years old. In October, 1901, experienced pain in the left ear, which was followed after fourteen days by otorrhœa. At the same time, glandular swellings appeared on both sides of the neck. Admitted February 10, 1902.

On admission, profuse, slightly fetid discharge from the left ear; the pus is mixed with blood; the upper canal-wall is sagging; the drum presents a perforation in the lower and posterior quadrant, through which pulsating pus exudes. The mastoid process is tender, especially in the region of the fossa and at the tip. The soft parts over the mastoid fossa are infiltrated. Hearing for the left ear is: whisper in $\frac{1}{4}m$. Marked glandular swellings in both sides of the neck, especially in the left submaxillary region. Temperature 37.8°. Nose and throat and lungs normal; right ear normal; urine normal. The eyes show no abnormality.

Operation, Feb. 12th.—On retracting the periosteum a quantity of pulsating pus was suddenly evacuated from a bony fistula. The bone in the mastoid fossa is discolored and presents a number of hemorrhagic points. The mastoid tip is removed, which contains a single, large cavity filled with hyperæmic mucous membrane and granulations. The granulations extend to the antrum and posteriorly to the dura of the posterior cranial fossa. The dura is covered with thick granulations; the outline of the sigmoid sinus cannot be detected. On careful curetting of these granulations a copious venous blood stream appears, necessitating packing.

Subsequent Course.—The first dressing was changed on February 19th. The hemorrhage had ceased, the temperature was somewhat irregular for the first week and then remained normal. On February 26th the perforation in the drum membrane had healed. The glandular tumors were subsequently removed in the surgical clinic, and proved to be tuberculous.

ON PRIMARY EPITHELIOMA OF THE TEMPORAL BONE.

By DR. STURM,

FIRST ASSISTANT AT THE UNIVERSITY EAR CLINIC IN ROSTOCK.

Translated by Dr. ARNOLD KNAPP.

THE following case may aid in explaining the mode of origin of primary epithelioma in the cavities of the temporal bone.

H. W., forty-two years old, was admitted Dec. 2, 1900, and died on May 24, 1901. The patient comes of a healthy family, no member of which had suffered from cancer. He himself had never passed through any severe illness, though there has been discharge from the right ear since childhood, which has not given him any particular discomfort and has not been treated. In April, 1900, about eight months ago, severe vertigo set in which continued for several days, with marked noises in the ear. Since June he has often experienced pain in the right ear, and during the past few weeks a sensation of drawing in the right half of the head, especially in the lower jaw, causing the movements of the jaw to be painful. Some tenderness in the parietal region.

On *admission*, Dec. 2, 1900, no vertigo, no vomiting. On removing the pus from the right auditory canal, a fistula is discovered in the upper and posterior wall which admits the probe to the depth of 1 cm. The depth of the canal is filled with granulations. The mastoid process externally is normal. The hearing on the diseased side is entirely lost. Tuning-forks are not perceived and Weber is transmitted to the left. No facial paralysis, no glandular swelling. Eyes normal.

Operation, Dec. 3.—As the case was supposed to be one of ordinary chronic mastoiditis, a radical operation was proceeded with. The bone externally unchanged. On enlarging the bony

canal backward and upward, a large cavity is found in the mastoid process, which includes the mastoid cells, the antrum, and the tympanum. The ossicles have disappeared. The cavity contains no pus, but is filled with peculiarly tough, lobulated, yellowish-red masses which immediately suggested a neoplasm. Small pieces are preserved for microscopic examination. The dura of the middle cranial fossa, which is exposed to a large extent, is covered with small granulations and a flat softened piece of bone is firmly adherent to it. In the floor of the antrum near the inner wall a deep fistula is visible. Below the promontory the probe enters between roughened bone. In the direction of the posterior cranial fossa, near the sigmoid sulcus, a tissue of fibrous consistence is found firmly adherent to the bone. During the operation there were a number of spasmodic twitchings of the facial nerve, and on curetting the above-mentioned fistula a profuse hemorrhage occurred.

The piece of tissue removed for examination proved to be epitheliomatous of the squamous epithelial type. A secondary operation was suggested to the patient. We had in mind to completely remove the temporal bone up to the carotid canal and if necessary to remove the labyrinth. As we were unable to promise a definite cure, the patient refused further operation. There remained nothing for us to do but relieve his symptoms.

From the case history I should like to draw attention to the following features:

On admission, the patient presented the aspect of a healthy, well-nourished man without any evidence of a severe illness. Very soon the beginning of a cachexia made its appearance, principally in the form of a yellowish color of the face. Loss of weight did not occur until near the end, and for some time he even increased in weight. This is not unusual, if we consider that the disease remained circumscribed and the patient's nutrition was carefully looked after. The increasing weakness began in February, 1901. In the beginning of May he refused all nutriment, and in the middle of that month it was not possible to change the dressing while he was in a sitting posture. The marasmus rapidly increased, a large bedsore appeared, and two days before death he suffered an attack of collapse which required

artificial respiration. On May 24th he became comatose and died on the same day.

It is striking to note that at the beginning no glandular swelling was noticed. Two weeks after the operation a doughy tender swelling appeared in front of the tragus, which increased in size during the next weeks and seemed to be a parotitis. In January, 1901, a single gland appeared on the anterior surface of the sterno-mastoid muscle, and after six weeks another along the posterior margin of this muscle. Later a number of other glands appeared in this region.

Pain existed from the beginning and was felt not only in the ear, but also in the lower jaw, especially on mastication. Pain in the forehead and toothache were complained of. The end of February the maxillary joint became very sensitive and movements of the head were painful from infiltration of the sterno-mastoid muscle. A number of other sensations were complained of. In the middle of December the patient occasionally had the sensation on awakening from sleep as if he was unable to raise the head. Later a sense of pressure was experienced in the right ear, and vision became blurred on attempts to read. Somnolence appeared towards the end of the disease, later delirium. Temperature in general remained normal. There was some fever corresponding to the condition of the swelling in the parotid region. The pulse was generally somewhat soft. During the last two weeks in the evening it rose to 130 and 150, and one week before death it became irregular.

The condition of the wound was as follows: After operation the cavity in the temporal bone showed great tendency to bleeding. In December, tumor masses rapidly formed and ulcerated. Three weeks after the operation the cavity appeared like one after an ordinary mastoiditis. In the depth, however, in the place of normal granulations there were nodular, yellowish-red masses bathed in fetid pus. Subsequently the cavity enlarged in all directions and the profuse discharge became putrid. At the beginning of February the disease had invaded the Fallopian canal; some particles of bone were cast off and felt like grains of sand.

The facial paralysis became complete in the middle of March. A consecutive keratitis was successfully treated. Necrotic pieces of bone were removed from time to time with a forceps, and in the end of May destruction had so far extended that prolapse of the cerebellum and of the temporal lobe was only prevented by the firm bone of the Fallopian canal and of the labyrinth capsule. The discharge was also evacuated into the naso-pharynx.

Treatment consisted, in addition to a supporting diet, in the administration of increasing doses of morphin and frequent changes of dressing in which first hydrogen peroxid and later iodoform were used.

Autopsy-Report.—The dura of the middle cranial fossa is more injected than that of the anterior. On the anterior surface of the right petrous bone there is a tumor somewhat larger than a cherry, and to its inner side two smaller tumors which are all connected and covered by the dura. The surface is finely granular. Thick pus escapes from the right internal auditory meatus. At the right margin of the occipital foramen there is a defect in the dura filled with grayish purulent masses. In the surrounding part, especially at the anterior margin, the dura is yellowish and elevated by tumor masses. This change extends to the region of the internal auditory meatus. The pia at the base contains considerable blood and in the region of the chiasm is infiltrated with pus as well as posteriorly at the pons, medulla, and margin of the cerebellum. No change on the convexity of the brain.

Back of the right ear there is a large opening which leads into an irregular cavity containing putrid discharge and a sequestrum as large as a bean. The external margin of the cavity contains no tumor-like tissue, but the rest of the cavity is occupied by the new growth extending to the dura of the middle and of the posterior fossæ and anteriorly to the eroded maxillary joint, where bare bone is exposed. Along the inner wall there is a thin bridge of bone, the remnant of the Fallopian canal. It is impossible to decide whether a part of the cochlea still remains. The entire petrous bone may be said to have been entirely replaced by carcinoma.

The transverse sinus is filled with a gray softened thrombus throughout its horizontal portion; in its descending part it is invaded by the tumor process. The carotid artery is unchanged, but is completely surrounded by the new growth.

Below the ear there are a number of superficial and deep enlarged glands. There are no other metastases and no other pathological changes.

How is it possible for primary epithelial carcinoma to originate in the depth of the middle-ear cavities, where normally no squamous epithelium is present?

Kretschmann,¹ who collected a large number of clinically observed carcinomata of the temporal bone, paid considerable attention to this question without coming to any definite conclusion. He cites the views of various authors and concludes that the carcinomata of the temporal bone develop from the glands or the epithelial processes of the skin of the auditory canal and of the tympanic mucous membrane, or from polypi, and considers the origin to be in the tympanum or at the inner extremity of the auditory canal.

A number of cases of this kind have been published since the appearance of this paper. In most cases the tumor developed on the base of a chronic otorrhœa, just as in our patient. The development of the epithelioma is not difficult to explain in these cases without speaking of epithelial metaplasia, as cases of this kind have for a long time been familiar to surgeons.

In 1881, Nicoladoni² published a paper on the development of epithelioma in the presence of bone necrosis, and reported on a number of observations where, in the depth of an old bony fistula, epithelial carcinoma developed from the lining epidermis. In 1889, R. Volkmann collected the experiences of the Surgical Clinic in Halle on primary carcinoma of the extremities, of which the following is of interest to us.

"In the course of caries or osteomyelitis of the long bones, bony fistulæ develop, which do not heal, but discharge for

¹ *Arch. f. Ohrenhkk.*, vol. xxiv.

² *Arch. f. klinische Chirurgie*, vol. xxvi.

many years. In these cases the skin at the external orifice of the fistula extends for some distance into the canal. The canal is therefore lined with epidermis, and this may in certain cases extend to the bone or even deep into the bone. From the deep parts of such a fistula, at least from its epithelial lining, a carcinoma may develop, which fills the medulla of the bone."

If we replace the fistulous tract with the external auditory canal, and remember that in marginal perforations of the drum the epidermis of the canal grows into the middle-ear cavities and furnishes a lining for these, the analogy is striking. It may be further stated that another point of similarity is to be found in the slight tendency to glandular involvement and the formation of metastases.

Zeroni is inclined to accept this development of the primary epithelial carcinoma in the ear without mentioning the analogy of the fistulous carcinoma in the long bones.

TUBERCULOSIS OF THE EAR ENDING IN RECOVERY.

By DR. I. HEGETSCHWEILER, ZÜRICH.

(*Zeitschrift für Ohrenheilkunde*, Bd. lxiii.)

Translated by Dr. W. S. BRYANT, New York.

AT first I was pessimistic on the cure of tuberculosis of the ear, because the patients I had observed in the clinic of Prof. Bezold were cases of advanced lung tuberculosis, with necessarily an unfavorable outlook. But recently I have seen ear tuberculosis in commencing pulmonary phthisis, and have been able to note the action of local and general treatment. In consequence of this experience I have a better opinion of the results of treatment in these cases. I have been strengthened in this belief by a paper of Isaac Dreyfus,¹ who reports seven cases, in all of which the local affection disappeared. These fine results were brought about by: (1) improvement of the general conditions, by favorable climates, by mud baths, internal medication; and (2) local surgical interference to facilitate, by free opening of the middle ear and perfect drainage, the elimination of tuberculous tissues and occasional sequestra.

I beg to report several cases of ear tuberculosis which may perhaps claim some interest, especially in their clinical features.

CASE 1.—A man, aged forty-eight years, a mountain guide, had had hemoptysis, December 5, 1900, and again December 7th. He

¹ Über Mittelohrtuberculose mit specieller Berücksichtigung des Ausgangs in Heilung. Inaugural Dissertation, *Zeitsch. f. Ohrenhk.*, xliii.

was treated for consolidation of the left apex. On December 15th he had pain in the left ear, which increased in spite of treatment. On January 28, 1901, the patient became suddenly unconscious, and on January 30th, he was brought to the clinic where he lay three days. There was a spontaneous discharge from the left ear on February 8th, and consciousness returned. The discharge persisted with headache, tinnitus, and vertigo.

A diagnosis of the condition of the lung was made and it was thought that the ear affection was a complication of it. The patient was sent to the Wald Sanatorium.

Tests of hearing, April 1st :

Whisper : right, 2m ; left, om.

Tuning-fork: a¹ on vertex to right.

Lower tone limit : right, E₁₁ ; left, C² (?)

When the canal was cleaned, flabby granulations appeared which were removed by snare and curette, and the drum membrane was found absent. A probe was passed upwards and backwards for 3cm in the tympanum before it encountered a rough obstruction. This large cavity was evidently the result of caries of the mastoid antrum. Irrigation with the tympanic syringe brings out a milky, turbid fluid and epithelial masses resembling cholesteatoma. This conservative treatment was continued until April 17th, when the patient had pain in the left temple and the discharge became more profuse.

Operation, April 25th.—The first chisel stroke opened a cavity filled with creamy pus, which proved to be the antrum enlarged to the size of a walnut, from caries. The walls of the cavity were curetted and the wound was packed with aluminium acetate gauze. The wound gradually healed, but the discharge from the canal persisted. June 8th, a radical operation was performed. The malleus and incus were not found, and thickened dura mater appeared in the posterior part of the antrum over an area of 2cm. A Stacke flap was cut from the canal and made to cover the exposed dura.

June 14th, the healing had progressed without rise of temperature. The Stacke flap was adherent, but its tip was necrotic. The cavity became epidermized except where the dura had been exposed. Regular packing with gauze and later with creosote dressing and creosote internally caused the discharge to cease on September 3d.

On June 14th, six days after the operation, the patient left the

hospital for the out-patient department. His physical condition had improved under the creosote.

Remarks.—The tuberculous nature of the lung trouble was rendered certain by the hemoptyses and the physical examination. At first there was infiltration of the left apex. In August there were cough, pain, and night sweats. On percussion the right apex was dull and some moist râles were heard on auscultation.

The tuberculous origin of the aural lesion is clear from the following features in the case history: The aural affection began eight days after the second hemoptysis and on the same side as the affected lung. The drum membrane and the ossicles were completely destroyed in four months and replaced by flabby granulations. Extensive caries of the mastoid was found at operation. Tuberculosis alone is able to cause similar destruction in such a short time.

The tuberculous process produced in four months not only complete deafness in the affected ear, but threatened the life of the patient from the start, as shown by the attack of unconsciousness lasting six days. This was due, as shown at operation, to the extension of the tuberculous process to the meninges.

The dura often shows but slight reaction to inflammatory irritation, as was shown by the autopsies on cases of aural tuberculosis cited in my monograph.¹ I found that the dura lying directly over carious bone or even a pus focus may remain intact. In other cases the dura becomes affected in a variety of ways.

In Case 8 there were punctate injection and thickening over the anterior surface of the petrous bone.

In Case 9 there were great thickening and a crater-like opening. This was the only case where the dura was perforated, with consequent brain abscess.

In Case 10 there were several small gray granulations, which filled corresponding openings in the tegmen.

In Case 33 a dirty-gray layer of pus was found at the petro-squamosal suture and on the posterior surface of the

¹ *Die phthisische Erkrankung des Ohres.* J. F. Bergmann, 1895.

petrous bone. A similar condition was found in the case under consideration, as shown by the dirty-gray purulent membrane.

The six days of unconsciousness make it probable that the inflammation extended to the inner surface of the dura and affected the pia, as extradural abscesses do not usually cause such severe symptoms.

The rapidly progressing purulent condition was not due only to the tubercle bacilli, but to a mixed infection with streptococci, pneumococci, and putrefactive bacteria; the last type were very abundant in the nose, as the patient suffered from ozæna.

The serious feature of the case was the rapid extension of the process towards the brain, while there were no inflammatory symptoms on the surface of the mastoid process, not even tenderness on pressure.

The deep-seated carious process probably began in the antrum or its neighborhood. This is confirmed by the extreme pain in the beginning of the ear affection and the unusually protracted (one and one half months') rupture of the drum.

Owing to the flabby granulations and caries in the aditus and antrum, diagnosed with the probe, conservative treatment had to be replaced by operative, which consisted in first the simple and then the radical operation. Healing occurred after three months.

CASE 2.—C. C., a young Dane, was referred, March 2, 1900, for examination of the naso-pharynx. An ulcer was found in the nasal fossa; its tuberculous nature was confirmed by inoculation in the anterior chamber of the eye of a rabbit.

The patient had a long chain of enlarged glands on the right side. The ulcer in the nose was on the right lower turbinate. The posterior pharynx presented a swollen mucous membrane with three small ulcers with ragged edges. Two similar ulcers were situated in the naso-pharyngeal vault between the septum and the right Eustachian orifice.

Three days later the patient complained of tinnitus and fulness in right ear. The drumhead showed injection of the vessels on the hammer handle. March 31st a small opaque miliary nodule

was discovered in the postero-inferior quadrant between the umbo and annulus, surrounded by diffuse redness of the membrane; in other words, a small miliary tubercle as first seen by Schwartz, and its identity established by Habermann, who demonstrated the presence of tubercle bacilli.

After several days, owing to the breaking down of the tubercle, a dry perforation of the drum resulted.

The patient went to Davos for a long stay for treatment. Here the ulcers of the pharynx healed, aided by local applications of lactic acid. The perforation had healed, but moderate inflammation of the tympanum persisted, as evidenced by an injection of the membrane and râles on catheterization. Hearing distance for whisper increased from 30cm to 1m. The glandular swelling had also diminished.

This history as compared to Case 1 is a strong recommendation for mountain climate in ear tuberculosis.

Remarks.—In this case the nasal tuberculosis was confirmed by bacteriological examination. There can be no doubt of the cause of the ulcers in the naso-pharyngeal vault and of the subsequent ear trouble, especially as the development of the tubercle and subsequent perforation could be directly observed with the eyes. An unusual feature in the case is the fact that the breaking down of the nodule produced a dry perforation. The inflammatory swelling of the entire naso-pharyngeal mucous membrane in my mind points more to an extension of tubercle bacilli along lymph channels of the tube, than to a passive propulsion by the air current. This inference is supported by the observations of Schütz, E. Fraenkel, and others.

CASE 3.—This case occupies a middle position as regards the severity of its course. A woman, sixty-four years old, pale, anæmic, of slender stature, was first seen December 6, 1897, with a history of discharge of left ear from the first to the fifteenth year. In her twenty-first year she suffered with a long-continued irritating cough. In August, 1897, neuralgic pain began in the left mastoid, radiating to the left temple and the lower jaw of the same side. Soon afterwards otorrhœa set in with a rather scanty and thin discharge. The pain was improved by leeches and anti-neuralgic remedies, but was not entirely relieved.

On examination the right ear was found normal. The left auditory canal was very narrow and appeared dry. Some sagging of the upper wall, but not sensitive to pressure. The drum showed a central dry perforation. Mastoid tenderness on pressure at the tip. The anterior margin of the mastoid process was moderately swollen and tender. Difficulty in opening the jaw.

Hearing tests:

Whisper: right, 6m; left, at ear.

Weber to left. Rinne negative.

The patient complained of severe pain at night and begged for operation. I operated, hoping to find a focus to account for the continuous pain.

Operation, Dec. 9th.—Mastoid sclerosed. At a depth of 1cm the antrum was encountered, but appeared normal. The tip was then laid bare, and, as it was removed layer by layer, there appeared in the centre a grayish-white membrane 1.5cm long by 8mm wide, similar to a diphtheritic membrane of the tonsils. There was no visible reaction in the surrounding parts. The membrane was removed with a sharp spoon, and the wound healed entirely in six weeks, and the otorrhœa also ceased. The neuralgic pain gradually disappeared after the operation. The swelling of the soft parts between the zygoma and maxillary articulation continued for several weeks and then gradually diminished.

Remarks.—This case at first made the impression of an obstinate mastoid neuralgia. Tenderness at the tip, however, and the appearance of scanty otorrhœa were suggestive of a mastoid affection. The suspicion was confirmed at operation, where pathological changes were found explaining the radiating pain. At operation the membrane was supposed to be the residuum of an ordinary inflammatory process. A subsequent study of Scheibe's paper on "Mild Cases of Middle-Ear Tuberculosis and the Associated Formation of Fibrinoid" (*Zeitsch. f. Ohrenheilk.*, Bd. xxx., 336) showed that the membrane was an exudate which Schmauss and Abrecht, in an experimental paper, considered an initial stage of the caseation of tubercle, and called it fibrinoid. The circumstance that the membrane has previously only been found in the tympanum, on the promontory, and at the tubal orifice does not exclude its

appearance in the mastoid process, because the simultaneous changes may be found in tuberculosis in all parts of the ear, though not to the same degree. Though the presence of this membrane, according to Scheibe, always establishes the diagnosis of ear tuberculosis, we may call attention to the great reduction in hearing (speech at ear was heard but not understood), together with the extension of the process to the zygoma, similar to the Cases 1 and 3 described by Dreyfuss (*l. c.*).

CASE 4.—A clerk, first seen May 23, 1896. He gave a history of discharge from the left ear for twelve years, which began without pain. The discharge became more profuse and hearing diminished. In August, 1893, he was taken ill with a dry pleurisy on the left side, which lasted until February, 1894. Eight months later he was sent to Davos, and stayed there from November, 1894, to March, 1895. During this period he improved and the discharge almost stopped. A relapse of the pulmonary affection occurred. Bacterial examination of the sputa was negative. In June, 1895, he went to Weissenburg for four weeks. Sputum was again examined and found negative.

On examination, the right drum membrane was found normal; the left drum showed a kidney-shaped perforation. The mucous membrane of the promontory was thickened and there was a large polyp in the canal. This was removed and its base cauterized, resulting in a cessation of the discharge. The discharge returned April 1, 1900, and the malleus, which hung loose, was removed; April 12, 1902, the left promontory was covered with a gray adherent membrane which could not be taken off with the forceps. Insufflation of iodoform. Three weeks later a little of this membrane still remained and the discharge had increased. Bacterial examination of the pus was negative.

Remarks.—The long duration of the dry pleurisy and its improvement at Davos justify the diagnosis of tuberculosis, though sputum examination and animal inoculation were negative. The cause of the ear lesion was unclear up to the discovery of the fibrinoid formation.

A few words regarding the treatment of aural tuberculosis. In general the course of the systematic affection and the ear complications are parallel. An improvement of the general

condition is followed by a local improvement in the ear. The effect of high mountain climate on ear tuberculosis is due to the improved constitutional condition dependent on the increase of red blood corpuscles. Convalescence is aided by antiseptic treatment of the tympanum, which prevents the mixed infection. The insufflation of fine iodoform powder after cleansing and drying has been the most successful in my hands.

Surgical intervention must replace this conservative treatment when scar tissue is to replace polypoid hypertrophy of the mucous membrane and caries of bone.

ON THE PATHOLOGY OF DEAF-MUTISM.

REPORT OF A CASE OF ACQUIRED DEAF-MUTISM WITH OBLITERATION OF TYMPANUM, ADITUS, AND ANTRUM.

BY DR. HERMANN HÖLZEL OF MUNICH.

(*Zeitschrift für Ohrenheilkunde*, Vol. xliii.)

Translated by Dr. W. S. BRYANT, New York.

DEAF-MUTISM is either congenital or acquired. The relative frequency of these varieties is uncertain because the figures of various authors are contradictory. Most authors agree that the majority of cases are acquired. The hearing is destroyed before the child learns to speak, or it is lost afterwards, even then, generally before the seventh year. Uchermann¹ in 1885 found that among 1841 deaf-mutes in Norway the deaf-mutism was congenital in 51 %, acquired in 48.5 % and in 0.5 % it was uncertain. Mygind² found in 210 carefully examined deaf-mutes, 125 acquired cases, 54 congenital, 31 indefinite. According to Lemcke the deaf-mutes of Mecklenburg-Schwerin are divided as follows: Out of 516 there were 266 acquired, 217 congenital, and 33 indefinite. Bezold, finally, found in 138 deaf-mutes 64 acquired, 62 congenital, and 12 uncertain. In general, according to Mygind and Bezold, statistics for the congenital and the acquired forms in different countries show 33 to 174 acquired for 100 congenital.

The changes in the organ of hearing which underlie deaf-mutism have their seat usually in the sound-perceiving portion of the ear, the labyrinth, and are to be considered as sequelæ of brain or middle-ear affection. Habermann³ has

¹ *Arch. f. Ohrenheilk.*, vol. xliv., p. 278.

² *Die angeborene Taubheit*, 1890.

³ *Arch. f. Ohrenheilk.*, vol. liii., p. 53.

lately shown that exceptional conditions producing deaf-mutism may be found in the sound-conducting apparatus, the result of chronic catarrhal or purulent inflammations and their sequelæ.

Anatomical examinations of the changes of the hearing apparatus in deaf-mutism have not been made in great numbers. Including those of Mygind, there have been collected a little over 150 cases. These are mostly only macroscopic descriptions and only a very few were examined histologically.

When we consider the importance of the histological examination of these changes in the study of deaf-mutism, and that comparatively few have been examined, the description of the histological conditions of the hearing organ in the following case, which followed a chronic purulent otitis media, may seem justified. Unfortunately this description is principally an anatomical one, as it was impossible to ascertain more of the previous history and there were no known clinical data.

The specimen for examination is a right temporal bone for which I am indebted to Dr. Scheibe. It comes from a widow, thirty-nine years old, who was brought to the hospital on June 3, 1896, on account of extensive burns to which she succumbs after five days. As the patient was in a desperate condition, examination of the ear was impossible, and the possible remnant of hearing could not be determined, or any previous history obtained. The post-mortem examination was made on June 8, 1896. The temporal bone has remained until recently in alcohol; it was then decalcified in 5 per cent. nitric acid, rehardened in alcohol, imbedded in celloidin, and serial sections were cut vertically to the long axis of the petrous bone.

The sections were stained in Delafield's hematoxylin, except a few which were stained by Weigert's method for the purpose of the nerves.

General Autopsy.—A burn of the second degree of the skin, especially on the trunk, neck, and upper extremities, with extensive loss of epidermis; hyperæmia of the lungs; slight bronchitis; gravid uterus (abortion occurred one day

before death); splenic tumor; anæmia and slight œdema of the brain, and hyperostosis of the skull.

Macroscopic Finding in the temporal bone.—Externally no anomalies of the pyramid; auditory nerve present; tubal ostium normal.

Middle Ear.—After removing the anterior wall of the auditory meatus, the drum appeared irregularly depressed. The manubrium of the malleus was not demonstrable. In the region of Shrapnell's membrane there was an extensive and deep depression. In the region of the umbo there was a large white unyielding area (evidently an adhesion to the inner wall), and under this a horizontal convexity bulging upward. The grayish lowest part of the membrane seemed to cover a flat prominence which was a direct continuation of the postero-inferior auditory canal wall—in other words the bulb of the jugular, over which the membrane is situated. A needle introduced into the bulb of the jugular from below could be pushed through this flat elevation, which was somewhat transparent.

At the posterior periphery of the drum membrane there is a white irregular prominence consisting of thickened epidermis situated on solid bone.

There was some mucus in the mouth of the tube. A probe introduced through the pharyngeal end of the tube meets a complete obstruction at a depth of 2cm.

On chiselling off the tegmen of the tympanum and antrum, the bone seemed solid, entirely so in the region of antrum, and principally sclerosed in the region of tympanic cavity. The bone was removed until the membrane became visible, representing the depressed portion of Shrapnell's membrane.

A cavity corresponding to the tympanum or aditus was not present, but at the posterior end of the antrum there was a small irregular space extending backwards, the size of a small pea, which was lined with a thickened succulent reddish mucous membrane and contained serum.

A transverse cut through the mastoid showed that the bone was sclerosed throughout, the mastoid process was diploëtic only in its centre. In the outer wall of the sigmoid sulcus, about 1mm externally and 1cm above the mastoid

incisure, there is a second space as large as a pea, divided by a thin bony septum. A probe can be pushed from the lower cavity on towards the upper one for 1cm without reaching it.

The dissection of the temporal bone showed the sequelæ of a middle-ear inflammation, with obliteration of the tympanum, aditus, and antrum.

Microscopic Examination.—The cartilaginous portion of the tube was normal. The bony portion was present for nearly the entire distance to the tympanic cavity, but somewhat narrower than normal, and the mucous membrane was unchanged.

Just before reaching the tympanic cavity the bony tube ends in a blind sac and is obliterated by bone. In the unobliterated portion the tensor tympani is present in its canal. The muscle showed no changes, except that the striations could not be recognized.

As the tube was found obliterated close to the tympanic cavity, we must conclude, remembering the normal measurements of the tube (entire length 3.4 to 3.6cm, and the distance of the isthmus from the pharyngeal mouth 2.4 to 2.6cm), that the obstruction encountered at 2cm from the tubal mouth was either in the region of the isthmus, or that the tubal development had been arrested and that it was shorter than normal.

The tympanic cavity in its anterior part was filled with bone; the posterior part and the niche of the round window were filled with cicatricial connective tissue. There was no tympanic cavity. The ossicles were absent.

The niches of the oval and round windows were completely closed by new-formed bone, the promontory is considerably thickened with new bone, which joins the smooth bone of the labyrinth without demarcation. This hyperostosis occludes both windows, so that they are obliterated. The new bone is mostly compact, with occasional cancellous cavities. Intense staining of the section with hematoxylin shows much calcification, especially in the vessel walls.

Inner Ear.—The examination of the labyrinth shows many changes. These changes are to be seen especially in the cochlea. Most important is the first whorl of the

cochlea in the neighborhood of the round window, where the scala tympani is especially affected. This is filled with new-formed connective tissue and compact bone. The new connective tissue in this region fills the scala tympani entirely and the scala vestibuli in two-thirds of its volume. The lamina spiralis ossea, like the oval and round windows, is buried in the new bone. From this point the new connective tissue in the scalæ decreases. In the convoluted part in the first turn the bone formation is limited to the walls of both scalæ neighboring on the modiolus. The remaining space in the scala tympani is occupied by strands of loose connective tissue. The new bone formation is most marked in the scala vestibuli, especially in the angle which its wall makes with the lamina spiralis ossea. In this part of the cochlea is situated on the endostium of the scala vestibuli a coarse granular mass of detritus, which may be detached epithelial cells or coagulated lymph. It is probably not granulation tissue, as the nuclei are not stained. In the second half of the first whorl there is, in the angle described above between the outer wall and the lamina spiralis ossea, new-formed bone in the scala vestibuli, but not in the scala tympani. The lamina spiralis ossea plainly shows both of its lamellæ in this situation. The new bone in the beginning of the first whorl cannot be limited from the bone of the labyrinth wall similar to the conditions in the tympanic cavity. Judged by the character of these bone formations, the promontory wall seems to have been destroyed by an inflammation in childhood and was replaced by new-formed bone. In the middle and top whorl the conditions are the same as in the second half of the first whorl, only the formation of new bone is less. The ductus cochlearis is preserved except in two places of the middle whorl, in the first half of the first whorl and the second half of the middle whorl, where Reissner's membrane is absent.

Rosenthal's canal is present through its whole extent, but is decidedly narrower than normal, and contains besides new-formed connective tissue only a few ganglion cells whose nuclei are either wanting or hardly recognizable.

The ligamentum spirale shows no marked changes in the

entire cochlea; the crista spiralis is plainly visible, and the stria vascularis is indistinct. Corti's membrane is lacking throughout the cochlea. Corti's organ cannot be found in the first half of the first whorl; in the second half it is slightly indicated, becoming plainer in the middle of the top whorl, but forms only an indefinite conglomeration of cells. Reissner's membrane is wanting, as before mentioned, in the first half of the first whorl and in the second half of the middle whorl. In the region where it is preserved it is not stretched across in normal fashion, but bulges with a convexity extending into the scala vestibuli, so that the ductus cochlearis on cross-section is not triangular, as in the normal condition, but has a rounded outline and is markedly enlarged.

The aqueductus cochleæ is nowhere visible; whether it has been lost in the new-formed bone, and on this account is no longer recognizable as a canal, could not be determined with certainty.

The Vestibule.—The changes in the external surface of the lateral wall of the vestibule have already been described in the description of the windows. The inner surface of the promontory wall was also thickened with connective tissue and new-formed bone. The median wall of the vestibule, however, as far as its bony portion is concerned, shows no anomaly. In the posterior portion toward the semicircular canals the formation of new tissue on the lateral wall gradually diminishes, and the greater part of the lumen is preserved. In the vestibule, also, the new-formed bone cannot be differentiated from the normal structure. The membranous parts of the vestibule, the utriculus and sacculus cannot be found. The aqueductus vestibuli and sacculus endolymphaticus show no pathological changes.

The Semicircular Canals.—The ampulla for the horizontal semicircular canal is preserved. The ampullæ of the posterior and superior semicircular canals could not be studied on account of poor sections. The bony wall of the horizontal semicircular canal is lined throughout its entire extent with nodular, eroded, new-formed bone. In some places there is also new-formed connective tissue in the lumen. In the outer

half the new connective tissue and new-formed bone are much more abundant than in the inner half. Nevertheless the epithelial lining is preserved to a considerable extent in the first half, whilst in the second half it is entirely destroyed. The superior semicircular canal also has its walls lined with new-formed bone, so that it has lost its oval form on cross-section. The changes here are, however, far less than in the horizontal canal. The membranous parts are not preserved. The posterior semicircular canal shows a number of pathological changes. The lower half in some places approaches the normal, both in its bony and epithelial portions; the upper half, and the part common to the upper and posterior canals, are entirely filled in one place, by new-formed bone in such manner that the perilymphatic space is entirely obliterated, and only the epithelial canal remains.

The Auditory Nerve.—Nothing can be said with reference to the qualitative changes in the nerve; since the specimen had remained so long in alcohol, the staining of the nerve by Weigert's method gave no results. Whether the structure of the nerve was normal cannot be determined. Quantitative changes, however, could be demonstrated. The trunk of the auditory nerve, as far as its cochlear branch was concerned, showed no diminution in its size in its passage through the internal auditory meatus. In the canaliculi of the modiolus the absence of a large number of nerve fibres was plainly demonstrated. Between the lamellæ of the lamina spiralis ossea, as far as these are preserved (in the middle and top whorls), there were only indications of nerve fibres. In Rosenthal's canal, as before mentioned, the ganglion cells are diminished. The nuclei of the remaining ganglion cells are rather indefinite, or entirely wanting. The nerve fibres in the vestibule and the posterior ampulla for the most part fill their respective canals and seem to be normal, whilst a part of the vestibular branch, as far as it can be determined, is wanting. There is pigmentation in all the normal parts of the labyrinth.

The examination of this temporal bone, according to the changes described, shows not only destruction in the middle ear and labyrinth, but also new-formation of connective

tissue and bone. These changes must be considered as the residua of a chronic purulent disease of these cavities—that is to say, a panotitis. In addition, there was an absence of the drum; cholesteatoma; the tube, tympanum, aditus, and antrum were obliterated; sclerosis of bone, bony occlusion of both windows, hyperostosis of the bone on the inner and outer walls of the promontory, as well as the other changes in the labyrinth. All these changes must be referred back to a preceding middle-ear inflammation, which extended into the internal ear. That the labyrinthine changes must be considered as sequelæ of the middle-ear trouble is shown by the fact that the greatest changes were found in the wall of the promontory.

The reason for the deaf-mutism in this case can be found in the more or less advanced pathological changes in the middle ear and labyrinth. These changes have been often described by other authors, and have received the same interpretation. Corresponding to these advanced changes the purulent middle-ear trouble must have been especially virulent, such as we find in the infectious diseases, above all in scarlatina. Moreover, it must have taken place in early childhood, since loss of speech followed. Anatomically the deaf-mutism in this case is sufficiently explained, in the first place by the bony occlusion of both windows, and, secondly, by the changes in the labyrinth. Our case increases the relatively small number of observations in which the explanation of deaf-mutism rests upon the closure of both windows. On the other hand, the changes in the inner ear are of such a character that they alone would cause, if not absolute deafness, at least extreme hardness of hearing.

An unusual finding in the examination of this specimen was the obliteration of the tympanic cavity, aditus, and part of the antrum. Clinically it is well known that it is characteristic of these spaces that even in the most severe middle-ear trouble, including cholesteatoma, these spaces are never obliterated. In this particular they contrast with the peripheral pneumatic cells, which, in the course of a chronic suppurative ear trouble, as a rule, become obliterated (Bezold). The reason for this difference cannot be given at present.

The anatomical structure is the same for both; only from a developmental point of view is there a difference, as those parts which in our experience are rarely obliterated already exist at birth, whilst the pneumatic cells, which are so easily obliterated, do not appear until much later. That this diminution of these spaces in our case was not arrested development but an acquired anomaly, needs no special proof.

The results of the autopsy admit no other interpretation than that the conditions described are the expression, or rather the residua, of a long, intense, and perhaps oft-recurring middle-ear inflammation; the products of an inflammatory process which wrought a partial destruction of the bony structure and a consequent formation of bone.

The literature at our command on this subject contains no description of a case with the obliteration of these spaces. Mygind, in his compilation, quotes some cases in which a narrowing of the tympanum was demonstrated (Cases Nos. 14, 53, 96, 111, 116). These cases do not resemble ours, since there was no complete obliteration.

The obliteration of the middle-ear cavities is so striking a condition that it could not have been overlooked in the dissections of the temporal bones made up to this time, and if present would certainly have been described. When, therefore, we examine the literature upon acquired deaf-mutism in which naturally the most marked changes are encountered, and similar conditions are to be expected but have not been found, we must conclude then that the obliteration of the principal middle-ear cavities following purulent disease of the middle-ear is an extremely rare condition.

In conclusion, the author thanks Dr. Scheibe for his assistance.

REPORT OF THE MEETING OF THE NEW YORK
OTOLOGICAL SOCIETY, NOVEMBER, 24,
1903.

BY DR. ARNOLD KNAPP, SECRETARY.

THE PRESIDENT, DR. J. B. EMERSON, IN THE CHAIR.

PRESENTATION OF PATIENTS.

Dr. BERENS presented a patient upon whom he had performed the Schwartze-Stacke radical operation five weeks ago for a chronic suppurative otitis, with a large cholesteatomatous mass filling the attic and antrum, with pus in the mastoid cells. One week later he had performed the **plastic operation** which he had described at the last meeting of this Society. The patient's ear was dry, though it had not been treated for several days.

Discussion.—Dr. FRIEDENBERG asked whether the plastic procedure was applicable to cases where a less extensive operation was done.

Dr. BERENS said it was more applicable in less extensive operations.

Dr. WHITING stated that two years ago he had practised a similar plastic procedure by forming a long pedicle from the skin behind the wound, which he passed into the tympanum, his main object being to get the opening of the Eustachian tube closed, which he considered to be the most important point in the treatment of these cases. He had performed this operation on two cases and they had healed very readily.

Dr. DENCH asked whether this flap was better than a Thiersch graft.

Dr. BERENS said "Yes." He did not, however, always get as good a result as in the case which was exhibited, as the flap has occasionally sloughed. This, however, did not interfere with the healing of the wound.

Dr. GRUENING inquired why the plastic procedure had not been done immediately at the first operation.

Dr. BERENS said that it was on account of the bleeding and the length of the operation.

Dr. DUEL thought that placing a thick flap over the inner tympanic wall would have an unfavorable effect on the hearing.

Dr. BERENS thought that this was theoretically correct, though practically he had not found that the hearing was worse than in other cases, after operation.

Dr. MCKERNON asked whether Dr. Berens meant the immediate hearing after the operation or the subsequent hearing. He had found in all of his cases that the hearing was very much better within the next few weeks after the operation than after a longer interval of time.

Dr. GRUENING spoke of a radical operation which he had recently performed, where pus and cholesteatoma were found present. He applied the Thiersch grafts directly, with the result that after one week the entire wound appeared healed. He applied the grafts by placing them first upon rubber tissue, then cutting them in the desired shape, and then transferring them into the location desired.

Dr. DENCH thought that this would complicate the introduction of skin grafts, and said that he was very well satisfied with the method which he had practised, which was that of Ballance, where the grafts are held in place by cotton pledgets medicated with aristol.

Dr. LEWIS presented the case of a boy who had suffered from **sinus thrombosis**. There had been a scanty foul-smelling discharge from the right ear for three years. He never had had any medical treatment for the diseased ear. Eleven days previous he had complained of a nervous shaking, not a distinct chill, followed by severe pain in the head, and he had vomited five or six times. No dizziness. The patient was operated upon that same day.

Operation.—The incision through the skin over the mastoid process gave vent to the contents of a small subperiosteal abscess. Pus was also seen to be oozing from the bone itself, but no recognizable perforation was found. On removing the cortex considerable bleeding took place from the sigmoid sinus, the outer bony wall of which had in part been destroyed by necrosis. Possibly this bleeding may have been due to the tearing of abnormally firm adhesions which had formed between the sinus and its overlying bony roof. The latter was removed for a distance of 4 to 5 cm

back from the knee, thus rendering it easy to control the hemorrhage. The surrounding bone was also removed as far down as the bulb. The sinus, which was then opened, was found to contain a greenish mass; its inner wall was necrotic and discolored; and the adjacent cerebellum bulged and seemed to be soft. It was punctured a number of times and a free flow of serum was thus obtained. Smears from these punctures were examined microscopically with a negative result. The radical operation was then performed and a large cholesteatomatous mass was removed from the antrum and tympanic cavity. The sinus clot was removed and a free flow of blood obtained from the upper end; no flow, however, took place from the lower end. The mastoid wound was packed and immediately afterward the operation for the resection of the jugular vein was performed. The boy made an uneventful recovery. There is now behind the ear a slight opening which will have to be closed by a plastic operation. The tympanic cavity is dry.

Bacteriological Report.—Mixed infection in the mastoid cells; staphylococci in the wall of the jugular vein.

The Doctor reported upon a similar case which occurred in a young man eighteen years of age, who had had a chronic otorrhœa from the right ear. No other symptoms developed until three days before admission, when he was attacked with a pain in the right ear and in the right side of the head. The day before admission he had repeated chills, vomiting, and vertigo. The patient was pale and appeared very ill when he presented himself on August 19, 1903. He complained of dizziness and severe headache. The antrum was tender on pressure; the ear canal was normal; the tympanum contained granulations; the eyes were normal. The usual operation was performed, and the mastoid was found sclerosed; the antrum was filled with granulations and pus; the sigmoid sulcus was necrotic and in part destroyed; the sinus wall was thickened and yellow, and pulsation was present. The radical operation was performed. That night the patient had a repetition of the chills, but there were no symptoms pointing specially to the jugular vein. Chills occurred again on the following night. Accordingly the jugular vein was ligated and resected. Later, the sinus was opened and a large septic clot removed. Notwithstanding these operative measures the chills continued, the temperature rising to 107° F. The lungs then became involved, although the vein had been resected before the

sinus was opened and the infective clot disturbed. The mastoid wound presented a clean appearance, and yet the patient grew steadily worse. There was bloody sputum. He died in delirium on August 31st. The examination revealed a sterile clot in the jugular vein, but an infected venous wall.

Dr. LEWIS thought that these two cases very strikingly proved the dangerous character of the complications that may suddenly arise in a case of chronic purulent otitis media of an apparently mild type. Neither patient had had symptoms sufficiently serious to cause them to seek medical aid, and yet in one case a septic sinus-thrombosis had developed on the eleventh day after the first symptom had appeared, and in the other case it had appeared on the third day and had been complicated by a septic pneumonia, of which the patient died on the fifth day. Such an experience surely affords ample justification of our advice, to those suffering from chronic purulent otitis media, to have the radical operation performed when, after a fair trial, less radical measures have failed to cure the disease.

Discussion.—Dr. MCKERNON inquired whether an autopsy had been performed in the second case. In a somewhat similar case he had found a thrombosis on the other side.

Dr. LEWIS replied that no autopsy had been performed. He said that there were no signs in the external jugular to indicate an involvement of the internal jugular on that side. There were no symptoms present that pointed to an infective sinus trouble on the other side. The repeated chills and high temperature and death were due to the infective pneumonia.

Dr. GRUENING during the last year had had two fatal cases of sinus thrombosis. He had resected the jugular vein first, and then opened the sinus. He had found the inner wall involved. At autopsy, the brain corresponding to this sinus wall was infected. Notwithstanding repeated punctures, no abscess was found; the adjoining brain tissue appeared softened. He thought that this was one of the reasons for ill-success in sinus cases, viz: the inward progression of the infection. He inquired how the inner sinus-wall had best be treated, whether it would be best to curette it?

Dr. DENCH remembered a similar case of encephalitis, where, however, death was due to a hemorrhage into the spinal canal. He was of the opinion that encephalitis was an important topic, one on which very little definite knowledge existed.

Dr. WHITING spoke of two cases where the clot in the jugular vein had proved to be sterile, but there was an infectious infiltration of the venous wall near the heart. Streptococci had been found in abundance.

Dr. LEWIS replied that Dr. Dixon, the pathologist, had stated that the conditions found in this case, viz., that the clot is sterile and that the venous wall is infective, were the ones usually found.

PRESENTATION OF SPECIMENS.

Dr. ARNOLD KNAPP presented specimens obtained from two cases of **nasal lesions with endocranial complications.**

CASE 1.—The first case was that of an empyema of all the accessory cavities of the nose, with **osteomyelitis of the ethmoid bone.** The patient was operated upon and osteomyelitis supervened, extending in the diploë of the frontal and parietal bones and subsequently causing a sinus thrombosis of the right sigmoid sinus, septic pneumonia—the patient dying of meningitis. The case has been reported in these ARCHIVES, vol. xxxii., page 181.

Dr. KNAPP asked what the experience of the members of the Society had been in osteomyelitis of the cranial bones?

CASE 2.—**Sarcoma of the dura mater.** The case was seen in a moribund condition, temperature 105° , with signs of meningitis and right exophthalmos. The autopsy revealed purulent meningitis and a tumor which had lifted up the dura from the base of the anterior cranial fossa, evidently growing from this membrane. It had perforated the cribriform plate, filling both nasal cavities; the bony septum, the ethmoid labyrinth, and the outer walls of both nasal cavities were wanting. The growth had extended into the right orbit; the sphenoidal sinuses were filled with pus; the tumor at one small point extended upwards through the dura and invaded the brain tissue of the right frontal lobe. Microscopically, it proved to be a sarcoma.

Dr. DENCH had had some experience with osteomyelitis, though he had never seen such an extensive case. He remembered one case that presented a swelling over the mastoid process; the squama was involved. The patient died with symptoms of meningitis.

In another case, during the after treatment (after operation), owing to excessive granulations he examined the wound more carefully and found extensive destruction, which invaded the occipital, parietal, and temporal bones. In another case, he had found a very marked extension into the occipital bone. The

patient was syphilitic and the condition improved markedly under anti-syphilitic treatment. In another case, there was a swelling over and in front of the auricle. There was a great deal of pus, but at the same time there was little in the middle ear to account for it. He proceeded to make an incision over the auricle, and exposed an area which led to a diseased zygomatic arch, which in turn connected with a diseased antrum.

Dr. WHITING said he had seen one case of mastoiditis which had been operated upon with the burr. The patient came to him subsequently with a large swelling on the right side of the head. The condition was diagnosed as an osteo-sarcoma by some other practitioners. He had exposed the bone and found it to be extensively involved, the process involving part of the occipital bone, the squama of the temporal bone, the parietal, the great wing of the sphenoid, the zygomatic process, the external angular process of the orbit. The bone everywhere was very soft, but in no place apparently had it invaded the dura, this structure presenting a number of very firm and minute granulating points. The case made an uneventful recovery.

Dr. GRUENING thought that the cases reported by the last two speakers were practically cases of osteitis, with which we are perfectly familiar. He thought that osteomyelitis where the process extends into the diploë without invading the inner structures of the skull, as in the case presented, was very rare.

Dr. HARRIS spoke of the frequent combination of disease of the accessory sinuses and mastoid disease.

VOLUNTARY CONTRIBUTIONS.

Dr. DENCH reported the case of a child, seven years old, on whom he had done a radical operation three weeks ago for profuse suppuration. There were no symptoms; the temperature was 100.5° on admission. During the operation the dura was exposed; the wound was immediately covered with Thiersch grafts. Two days later the child vomited; the temperature rose to 103°, continuing up to 107°. The wound looked healthy, but symptoms of **meningitis** supervened and the patient died one week later. Lumbar puncture was negative. He suspected that the infection to the meninges took place through the dura exposed at the time of operation; and he reported the case in order to warn against exposing the dura.

In another case, an acute mastoid operation had been done and

later, a radical operation, which had left the ear almost dry, with, however, a posterior opening and a small area of suppuration from the Eustachian orifice. He closed this opening, curetted the mouth of the Eustachian tube, and introduced a skin graft. The patient returned on a Friday, with headache, vomiting, coma, and in convulsions. The other ear was found to be suppurating, so an operation was performed on that side. The tegmen of the antrum was defective, the dura inflamed; the brain was tapped, without result; the ventricles tapped; the cerebellum was also explored, but found to be normal. The patient died thirty hours later. He thought that there were a certain number of cases where death was caused by a rapid inflammation of the brain tissue, viz.: **encephalitis**.

Dr. WHITING thought that in the first case reported by Dr. Dench the meningitis must have been due to some other lesion, which was undiscovered.

Dr. DUEL also thought that the infection took place before the operation. He did not think it was good practice to cover the dura with a graft, in an unclean wound.

Dr. GRUENING did not think it was unusual to have a rise of temperature after a radical operation, especially when skin grafting was practised.

Dr. BACON also warned against exposure of the dura.

Dr. HERMAN KNAPP thought that it was not the exposure of the dura which was to be avoided, but the injury to the dura.

Dr. WILSON wished to make a further report upon **tumor of the auditory canal**, of which he had spoken in the former meetings of the Society. The tumor had at that time been apparently cured by X-ray treatment, but relapsed after an interval of six months. It had now again been healed by a further course of treatment by X-ray, combined with radium. The treatments have now numbered between 100 and 200, and never have produced any irritation in the canal.

Dr. GRUENING inquired in what way the radium had been applied.

Dr. WILSON replied that a radium tube had been inserted in the ear.

REPORT OF THE TRANSACTIONS OF THE SECTION
ON OTOTOLOGY OF THE NEW YORK ACADEMY
OF MEDICINE.

MEETING OF NOVEMBER 12, 1903. DR. E. B. DENCH IN THE
CHAIR.

The minutes of the previous meeting were read by the Secretary,
Dr. Arthur B. Duel.

PRESENTATION OF CASES.

Dr. CARL KOLLER presented a case of **scarlatinal panotitis**. The patient, a little girl of four years, was taken with an illness which resulted in total deafness on May 24, 1903. The illness began with vomiting and fever, the vomiting lasting for three days. Scarlatina eruption appeared the day after onset, followed two days later by the appearance of diphtheritic membrane in the throat and a swelling of the glands. The first evidence of ear trouble was at the end of the first week. The child complained of pain and deafness. This was soon followed by a discharge from both sides. Entire deafness resulted within twenty-four hours after the appearance of the ear symptoms. There was a suppurating submaxillary gland on the left, otherwise recovery was uneventful. At the time of admission to the hospital (July 21), both ears were discharging profusely, and the submaxillary and cervical glands were swollen; the mastoid tips were sensitive to pressure. Examination showed a large perforation of the ear drum on both sides and granulations in the middle ear; on the left, necrosed bone could be felt with the probe. Considering the deafness, panotitis with necrosis of the labyrinth was diagnosed. An operation was decided upon to remove the supposed sequester, and because it seemed possible that some portion of the labyrinth and nerve had escaped complete destruction and might revive when freed from the surrounding infiltration and suppuration. On July 22d the radical operation was performed on the left side; the antrum was filled with pus and granulations, and so

was the attic. The ossicles imbedded in the granulations were removed. From the medial wall of the attic a loose, shell-like sequester could be detached, which proved to be part of the labyrinth, consisting of the superior and external ampullæ and the adjoining parts of the (sagittal and horizontal) semicircular canals. Another smaller piece of bone loosely connected with the facial nerve (taken from a place below the first piece) contained the posterior inferior portion of the annulus tympanicus. After its removal the facial nerve lay entirely bare in the cavity for a considerable distance; every time it was touched the face twitched. The bone cavity was smoothed with the electric burr and tamponaded with iodoform gauze; the wound behind the ear was left open for the present. After two weeks the wound behind the ear was closed. Koerner's plastic method was employed to widen the auditory canal, so that it would adapt itself to the increased calibre of the united middle-ear cavities. These are now entirely smooth and covered with dry epidermis; a newly formed pseudo-tympanic membrane closes them against the Eustachian tube. This is the only result of the operation, however; the hope of a partial restitution of hearing has not been realized.

Dr. CHARLES W. RICHARDSON read a paper entitled "Osteomyelitis of the Temporal Bone," which is published in full on page 1 of this number.

Discussion.—Dr. HERMAN KNAPP spoke of the uncertainty in osteomyelitis, and remarked that the fever in most cases could not be accounted for. He cited a case he had known, which the attending surgeon pronounced osteomyelitis acuta. In this case the pyæmic symptoms were marked. The patient died. Dr. Knapp said he had been unable to find many cases which answered to the definition osteomyelitis, met with in medullary bones, be they flat or cylindrical. It exists only in the diploic variety of the mastoid. It may be acute or chronic. The cases which he had observed were acute, and two of the most pronounced were distinguished by the mildness of the initial tubotympanic inflammation. The inflammation in the mastoid and in the adjacent bones, especially the occipital, was very extended and severe. Several operations were required. The first showed the antrum filled with pus, which advanced through thread-like passages through the diploic portion below the antrum, forming small deposits, filling some of the cells in the lower part, presenting a solid boundary surface of the sigmoid sulcus. The whole

exterior cortex of the mastoid was removed so thoroughly as to leave no suppurating or decaying portion recognizable. The extension was in the upper part of the mastoid, in the cavities in and around the posterior root of the zygomatic, at the medial and lower surface of the tip. Particularly developed were the supuration and decay of the bone in the lower part of the occiput, where smaller and larger loose pieces of decaying or necrosed bone were buried in pus. The pus went down the neck along the sterno-cleido, and under the thick muscles under the deep posterior cerebral fascia. The thick muscular layers were partially incised and drained by a counter opening, avoiding the splitting of the thick muscular layers. By this treatment and a comprehensive bandage the cases ultimately recovered permanently. The destruction by caries and necrosis of the side of the head was excessive in a scrofulous lad of sixteen years, but he recovered perfectly and without a relapse. The hearing in these cases was damaged but little, or not at all.

Dr. MCKERNON said that his experience in osteomyelitis had been limited; he recalled but two cases he had had. One was a girl of nineteen, admitted to the hospital with the history that seven days before she had complained of pain in the ear and back of the ear over the mastoid; on the second day a discharge from the ear—watery, without pus or muco-purulent elements. When she presented herself at the hospital for operation the temperature was 104° , the skin being the characteristic color described by Dr. Richardson. There was swelling over the mastoid process well up over the squamous portion and well down towards the occipital protuberance. The mastoid operation was done. The cavity was small for a person of that age; the lower portion seemed to be somewhat soft, although no pus was found in it. Communication was established between the antrum and the middle ear and the cavity flushed with alcohol. The patient was then returned to the ward. The next morning her temperature was 102° . Just twenty-four hours after the operation the temperature rose to 105° ; the patient was very uncomfortable, and there was some slight nausea. Dr. Dench was asked to see the case in consultation. The entire cavity of the mastoid was covered with a membrane which could be taken up with the forceps, and little sections of it could be removed. It looked almost as if it had been a mastoid re-infection. This membrane was scraped off and the cavity flushed out. The next day an examination of the

sigmoid sinus was made, nothing being found. The patient became worse; the fifth day after the operation she died, the temperature just before being something over 106°. The second case was that of a young lady, and was also fatal. Dr. McKernon thought that in both his cases there was almost true streptococcus infection.

Dr. PHILLIPS considered that Dr. Richardson's paper would, no doubt, bring to light many cases that at least show marked symptoms of the disease described. He called attention to the fact that both the cases described in the paper were of the acute variety. He remarked that while physicians were not fully agreed as to the cause of the acute variety, there seemed to be no question as to the cause of the chronic form—that it was either tubercular or syphilitic. It seemed to be clearly understood to be due to some underlying constitutional disturbance. This, he thought, involved the question as to the extension of an ordinary mastoid suppuration into the structure of the temporal bone as a cause of osteomyelitis; also, that it was possible for osteomyelitis to primarily attack that portion of the structure and to extend to the denser portion of the bone itself.

Dr. Phillips spoke of one case of chronic suppurative otitis media in a boy, which had persisted from the time the child was six or eight years old, until his thirteenth year. A few days after a severe fall, symptoms developed which led to operative interference, on the basis that there was some cerebral complication. When he operated, he found an involvement of almost the entire temporal bone; he opened the lateral sinus, and found no disease, but the case proved to be a general purulent meningitis. The case terminated fatally. Post-mortem showed that the disease had extended into every portion of the bone, but especially had it honeycombed the petrous portion.

Dr. KNAPP said that in the majority of cases osteomyelitis was traumatic or an acute inflammation.

Dr. PHILLIPS said that the serious symptoms in his patient had followed a serious injury from a fall on the head, but that when he opened the mastoid he found no positive evidence of injury.

Dr. BERENS said that it had occurred to him that the reason cases of osteomyelitis were so rare was that diploic mastoids were not commonly seen. He had lately seen something like one hundred mastoid bones, but among them had been none of the diploic variety. There had been only a few that were mixed—diploic

and pneumatic—and in these, the diploïc condition was not well marked.

Dr. KOLLER remarked that he had lost a case, which he at that time had considered a case of acute mastoiditis of an especially malignant infection, but which evidently belonged to the class of cases described by Dr. Richardson, forming a distinct class or type by themselves: It concerned a man of middle age, who was operated upon for mastoiditis after an acute otitis. At the operation, such a wide-reaching destruction of the temporal, parietal, and occipital bones was found, that no limit could be reached. The bone was softened and the diploë discolored greenish-gray, like a diphtheritic membrane. After the operation the fever abated a little but soon continued its septic course. The soft covering of the skull showed a progressive œdema with development of phlegmonous abscesses. The œdema extended down the neck almost to the shoulder. In the beginning it resembled erysipelas somewhat. Metastases in the knee-joint and at other places developed and the man died from pyæmia. No autopsy was allowed.

Dr. DENCH cited a number of cases in his practice, which he regarded as instances of osteomyelitis, although the temperature charts had not been so characteristic of the disease as were those presented by Dr. Richardson. One case, seen eight or ten years ago, had all the characteristic symptoms of osteomyelitis, as described by Dr. Richardson. There was intense pain, high temperature, and extensive tumefaction of the soft tissues overlying the mastoid. Incision through these thickened tissues evacuated no pus. The mastoid, on being opened, was found to be diploïc, and this diploïc tissue was considerably congested and infiltrated. The patient died.

Another case, seen a number of years ago, was that of a patient with acquired syphilis. In spite of the fact that a thorough mastoid operation was performed, the temperature remained high after the operation, and at the first dressing the wound seemed very foul. The wound absolutely refused to heal until the patient was put upon specific treatment. Under large doses of the iodide, complete closure of the wound rapidly occurred. This case was one more of syphilitic osteitis than of osteomyelitis.

In another case, seen at the hospital two years ago, a complete mastoid operation was done. The patient did fairly well and was discharged from the ward. Subsequent examination of the case

in the Out-patient Department showed an exceedingly foul wound filled with granulation tissue. A probe inserted into the superior angle of the wound, passed downward, forward, and inward, detected exposed bone in the zygomatic fossa. The patient was immediately operated upon, and very extensive bony destruction was found to have taken place. The disease, in this instance, involved the zygoma, and extended up into the parietal bone and backward into the occipital bone.

In another case, that of a young negro, extended bony involvement was found. The disease, in this case, extended back into the occipital bone, and a very large area of dura was exposed during the operation. In this case, there was a probable syphilitic history.

In a recent case, which came under Dr. Dench's observation, the history was as follows: The patient complained of considerable pain in the side of the head; just above the ear there was a swelling about the size of a pigeon's egg. The auricle was crowded slightly downward and forward, and the case looked like one of furuncle of the superior canal wall. Examination of the canal, however, revealed no evidences of any localized abscess in the meatus. There was a discharge from the middle ear, and the patient had a temperature of about 102°. She was etherized and an incision made through the supra-aural tumefaction, evacuating about a drachm of pus. Exploring this opening, an area of roughened bone was found deep down in the zygomatic fossa. This roughened area surrounded a small sinus in the substance of the squamous plate of the temporal, and this sinus, in turn, led forward and backward in the tympanic vault. The usual mastoid incision was then made, and on removing the mastoid cortex, the entire mastoid was found to be diploic, and to be the seat of an osteomyelitis. The entire mastoid process was involved, the disease extending far backward, near to the occipital bone, but not actually invading it. Above and in front the disease involved the diploë of squamous plate and the root of the zygoma. The bony involvement was so extensive that a typical radical operation was done, the middle ear, external canal, and mastoid being thrown into one large cavity. After removing all diseased bone, the anterior angle of the wound was closed by two silkworm-gut sutures and the remainder of the wound was left open, the bony cavity being packed with iodoform gauze. The temperature fell immediately after operation, and at the end of five days was prac-

tically normal. The patient was again etherized, and the entire bony cavity was lined with Thiersch grafts and the wound completely closed by means of silkworm-gut sutures, all subsequent drainage taking place through the external auditory canal. The patient made a perfect recovery, and was practically well three weeks after the primary operation.

Dr. RICHARDSON said that he had little to add in conclusion, except to say that all his cases were carefully investigated as to their histories, and that in the cases referred to in his paper there was nothing either of tubercular or syphilitic nature manifested. The pus was examined and in both cases contained streptococci. He remarked that if there were more diploic cases there would probably be more cases of osteomyelitis than there are. In his last mentioned case, immediately before the second operation the temperature was 106.2°. Another peculiar feature was the outpouring of purulent discharge observed when this second operation was being considered. He was at a complete loss (other than osteomyelitis) to account for this. He was trying to solve in his mind if there was any other condition. He eliminated entirely septic thrombosis, because there was not a single indication of it. While watching the case and deliberating as to what to do, a little pin-point of pus came out on the diploë—something he had never seen before. It was so characteristic that the second operation was immediately resolved upon.

REPORT ON THE PROGRESS OF OTOTOLOGY DURING THE FIRST QUARTER OF THE YEAR 1903.

BY DR. ARTHUR HARTMANN.

Translated by Dr. ARNOLD KNAPP.

(Continued from page 496.)

NERVOUS APPARATUS.

68. **Grönland.** A case of acute labyrinthine speech-deafness. *Arch. f. Ohrenheilk.*, vol. lvii., p. 9.

69. **Roosa.** A case of disease of the acoustic nerves, causing profound deafness, accompanied at a later stage by pleuritic effusion and fibroid phthisis. Recovery. *Medical Record*, January 31, 1903.

70. **Strubbell.** Ménière's symptom-complex with anosmia and ageusia. *Wiener klin. Wochenschr.*, 1903, No. 4.

71. **Skulski.** A case of healed Ménière's disease. *Wratshebnaja Gaseta*, 1903, No. 3.

72. **Scheyer.** On diseases of the internal ear after the administration of salicylates. *Wiener med. Presse*, 1902, No. 22.

73. **Eemann.** Diphtheritic neuritis of the auditory nerves associated with other neuritides. *La presse oto-laryngologique Belge*, Heft 1, 1903.

74. **Mayer zum Gottesberge.** A case of multiple neuritis, with a special involvement of the acoustic and trigeminal nerves. *Monatschr. f. Ohrenheilk.*, 1903, 2.

68. A healthy boy of fifteen years was taken ill, while on a sea voyage, with pain in the head and abdomen, and gradually lost his hearing. On examination, wavering gait with eyes closed, peculiar monotonous speech, slight catarrhal otitis. A functional examination showed on the right ear, defect for H to g' ; left defect for d to d' , g' to d' , as well as bilaterally C' to F'' ; in other words, defect in the parts of the tone scale necessary for the comprehension of speech. During an observation period of three months, the tone gaps changed in position and extent, and frequently disappeared entirely on the left ear. The understanding

for speech varied. Various vowels were heard, consonants, some syllables were correctly, others incorrectly, understood. The general condition and the gait improved, the tone gaps at the last examination showed the same defects as at first. The diagnosis was made of a labyrinthine speech-deafness, and the probable cause was supposed to be a mild cerebro-spinal meningitis.

A little over one year later, after another sea voyage, his general condition was good, gait steady, no vertigo, better comprehension of speech, tone gaps increased, especially on the right ear.

HAENEL.

69. The interesting points of this case are twofold: First, the recovery after a lapse of so many years (from 1888 until 1889). He had not been able to hear from right ear. He had had three attacks of impairment of hearing, tinnitus, after the original seizure. But in 1898 both ears became and remained normal. Second, the patient has a good degree of general health, and his pulmonary symptoms have improved very much. He lives in New York in the winter, and during the summer in Maine. The treatment was stimulating, strychnine and alcohol, and later the Russell emulsion. ROOSA finds it impossible to say what the lesion in the acoustic nerve was.

CLEMENS.

70. A patient forty-eight years of age was suddenly taken ill with vertigo, tinnitus, and vomiting. Then sleep for thirty-six hours set in. On examination there was right-sided deafness, absence of sense of smell, and marked diminution of taste. After treatment with iodide of potash, improvement. The tinnitus and the complete loss of smell persisted.

WANNER.

71. Sudden onset of Ménière's symptom-complex in a man of thirty-nine years with apoplectic habit, who had suffered for the last three years with deafness and tinnitus in the right ear. After catharsis, mustard applications, and caustics applied to the mastoid process, rapid improvement set in. Sodium bromide and iodide of potash were given. The mastoid process was faradised. In the course of one month the tinnitus disappeared.

SACHER.

72. Report of a case where five powders of $\frac{1}{2}$ g sodium salicylate were given for articular rheumatism. After seven days, onset of tinnitus, headache, vertigo, deafness. These symptoms continued notwithstanding the cessation of the drugs. Examination

of the hearing showed an acute affection of the internal ear. Whisper was heard on the right side in 2m, on the left not at all. After four weeks the hearing had increased from $1\frac{1}{2}$ -4 $\frac{1}{2}$ m. Vertigo and left-sided tinnitus remained. The author warns against the use of salicylates without an exact investigation of the kidneys and the ears.

WANNER.

73. After collecting the literature on this subject, a case of neuritis of the auditory nerves after diphtheria is reported. The rarity of this condition is questioned. As treatment a long-continued administration of pilocarpine is recommended, even in cases where in the beginning there is no improvement.

BRANDT.

74. A young man seventeen years of age, after a severe cold, suffered within ten days from headache, congestion of the head, facial herpes, vomiting, vertigo, and complete deafness. In addition all the peripheric nerves were extremely sensitive to the touch. Though all the symptoms of the other nerves disappeared, the deafness, notwithstanding energetic treatment, remained.

PIFFL.

THE NOSE AND NASAL PHARYNX.

a.—GENERAL.

75. **Mader.** On nasal and mouth breathing. *Bresgen's Sammlung*, 1903.

76. **Valentin.** Salpingoscopy or cystoscopy of the naso-pharynx. *La semaine médicale*, 1903, p. 2.

77. **Cordes.** A new conchotome. *A. f. O.*, 1903, p. 1.

78. **Noltenius.** Improvements in my trocar for the treatment of empyema of the maxillary antrum. *M. f. O.*, 1903, 1.

75. The importance of nasal respiration is dwelt upon, and the evil results of mouth breathing are described.

BRÜHL.

76. Description of an instrument to examine the naso-pharynx, and especially the tubal openings. The electric lamp is one of four volts, the diameter of the metal canula 4 $\frac{1}{2}$ mm. The instrument is passed along the lower nasal meatus, and one obtains better pictures of the roof of the pharynx and the later pharyngeal walls than in posterior rhinoscopy.

OPIKOFER.

77. An instrument on the plan of a guillotine, to remove hyperplasias of the turbinals with broad bases, as well as soft tumors of the septum.

PIFFL.

78. The improvements consist in a strengthening of the handle, a lengthening of the obturator, and the adding of an intervening

piece to connect with the syringe to permit irrigation of the maxillary antrum. PIFFL.

b.—TUMORS OF THE NOSE.

79. **Hamm.** A rare tumor of the nasal mucosa. *Münch. med. Wochenschr.*, 1903, No. 8.

80. **McReynolds.** Recurring multiple angiomata of the septum. *Four. Am. Med. Assoc.*, March 7, 1903.

81. **Baurowicz.** On the localization of the so-called polyps of the nose. *Arch. f. Laryngol.*, vol. xlii., p. 451.

82. **Cordeas.** Adeno-carcinoma of the nose. *Berl. klin. Wochenschr.*, 1903, No. 8.

83. **Chavasse.** Naso-pharyngeal polypi removed through the mouth. *Arch. internat. d'otologie*, etc. 1903, p. 10.

79. A lobular tumor as large as a cherry, situated at the anterior extremity of the lower turbinal, which had caused repeated hemorrhages. Microscopic examination revealed a cavernous lymphangioma. Recurrence after the first removal. Healing after cauterization with chloride of zinc. SCHEIBE.

80. The patient, whose mother was for many years subject to repeated severe attacks of nasal hemorrhage that had resisted all efforts of relief, was a man, aged thirty-two years, who on each side of the cartilaginous septum presented a few very dark blue elevations, each about the size of a pea. They were most numerous in the anterior superior portion and almost entirely composed of blood-vessels of the venous type. Electrocautery and electrolysis secured but temporary relief. M. TOEPLITZ.

81. The polyp was situated at the anterior extremity of the lower turbinal in a patient nineteen years of age. ZARNIKO.

82. The tumor was observed in a patient seventy-five years of age, starting from the region of the right ethmoidal bulla. It consisted of a connective-tissue stroma and epithelial cell nests. The latter were in the form of typical gland passages, occasionally consisting of compact cell masses which in general revealed the original character of glands, though they must be regarded as atypic hypertrophies, because of the absence of a basal membrane and of a lumen. Of these adeno-carcinoma of the nose, only eight cases have been described. In the above case the tumor was very much reduced in size by electrolysis, a radical operation not being consented to, and finally completely removed by the use of Schaeffer's forceps; after nine months no recurrence was to be seen. MÜLLER.

83. Two cases of naso-pharyngeal polypi. Removed through traction by way of the mouth. Histologically they proved to be fibro-myxomas. OPIKOFER.

C.—ACCESSORY CAVITIES.

84. Harner. On the surgical treatment of chronic empyema of the maxillary antrum. *Wiener klin. Rundschau*, 1903, No. 7.
85. Hajek. On the radical operations and their indication in chronic empyema of the maxillary antrum. *Wiener klin. Rundschau*, 1902, No. 4.
86. Rethi. On the radical operation for obstinate empyema of the maxillary antrum, by way of the nose. *Wiener med. Wochenschr.*, 1903, No. 12.
87. Knochenstiern. On the etiology of empyema of the maxillary antrum. *St. Petersburger med. Wochenschr.*, No. 12, 1903.
88. Hug. A case of tooth cyst (peridental or periosteal cyst) of the maxillary antrum, with special reference to its histology. *Arch. f. Laryng.*, vol. xiii., p. 398.
89. Holmes. Suppuration of the frontal, ethmoidal, and sphenoidal sinuses. *Boston Med. and Surg. Jour.*, March 19-26, 1903.
90. Delie. Chronic maxillary and frontal sinusitis. *Arch. internat. d'otologie*, etc., 1903, p. 140.
91. Guisez. The surgical treatment of purulent ethmoiditis. *La presse médicale*, 1903, p. 167.
92. Paunz. On rhinogenic cerebral abscess. *Arch. f. Laryng.*, vol. xiii., p. 427.
93. Kelling. The analysis of the contents of a mucous cyst of the frontal sinus. *Wiener med. Wochenschr.*, 1902, No. 32.
94. Somers. Chronic sphenoidal abscess. *Amer. Medic.*, Feb. 28, 1903.

84. As radical methods give no better results than the conservative ones, this author employs the latter, and considers the methods of Jansen and Bönninghaus to be unjustified. Nine cases are described which have been operated on by the Caldwell-Luc method as modified by Hajek. These did not give so favorable results as Hajek describes, as in not one of the cases was there a complete definite healing. This is explained by the author perhaps in the severity of the various cases and the interpretation of the term "healing." Notwithstanding he prefers this method to all the other radical ones.

A method is described where the middle third of the lower turbinal is removed, and a large hole $1\frac{1}{2}$ cm is made with the chisel near the floor of the nose. Gauze is left in the cavity for eight days, after which no gauze is used and no irrigations are practised. Complete recovery did not take place in any of the seven patients in the short time of treatment. WANNER.

85. The acute empyemata can be treated conservatively by

irrigation or puncture in the lower meatus of the nose, except those of dental origin, where after extraction of the tooth the perforation of the alveolus is indicated. On the other hand, many subacute and chronic cases recover after systematic irrigations, or after the performance of the Cooper, Krause, and Küster operation. According to *HAJEK*, an empyema of the maxillary antrum, which is cleansed several times a day, never gives any special symptoms, and there is no reason why a radical operation should be performed.

His own radical operation is described, which is a modification of the Caldwell-Luc method. Of nine cases, five were completely cured which had been operated on more than a year; two are nearly cured; the two others have only recently been operated on.

WANNER.

86. *RETHI* recommends his method of opening the maxillary antrum from the nose. The anterior $\frac{2}{3}$ of the lower turbinal are removed, thereupon an opening is made with the chisel, and enlarged with the bone forceps in the direction of the middle as well as lower meatus. The granulations are removed. The operation can be performed under cocaine in 15 minutes. This author regards the more radical procedures as unnecessary.

WANNER.

87. After opening through the canine fossa, the antrum was seen to be divided into two chambers by a bony partition. This partition ran antero-posteriorly, very thick at the margin, thinner in the middle where there was an opening. The inner or nasal cavity contained pus, but the mucous membrane was but little changed. The outer cavity contained pus and was completely filled with polypous masses, and the bone was often bare. From this condition the author believes that the empyema was of dental origin.

SACHER.

88. A large tooth cyst in the superior maxilla was removed in a woman fifty-one years old, by *Siebenmann*. The membrane of the cyst was removed and a piece of mucous membrane from the alveolar margin was implanted by subperiosteal resection. The cystic membrane was peculiarly covered with numerous layers of stratified squamous epithelium. (The paper concludes with remarks on the classification of antral cysts and the origin of the epithelium.)

ZARNIKO.

89. After reviewing the anatomy of the three sinuses, *HOLMES*

discusses the etiology of the suppuration. Among the 237 patients, 61 had deafness from catarrh, 83 attributed the affection to influenza, 17 had constant catarrh after diphtheria, 12 from severe injury, 11 scarlet fever, 8 pulmonary tuberculosis, 7 syphilis. In one case a left sphenoidal and posterior ethmoidal suppuration started after typhoid fever. In 30 cases no cause was given. Acute inflammations usually subside without treatment. If the discharge persists, an atrophic condition of the mucous membrane takes place; in 11 among 14 the crust formation ceased after relieving the sinusitis. In one of the sphenoidal cases there was necrosis through the roof and an epidural abscess, which was emptied after drilling through the floor. The sphenoidal cavity was diseased in 182 (77 %), and in 19 (8 %) both sides were affected. In 56 sphenoidal cases the ethmoid also, and in 3 all accessory cavities, contained pus. In 39 patients the ethmoid alone was diseased, in 11 with the frontal sinus. In 5 cases of frontal-sinus suppuration no complication of the ethmoid was found. Antral empyema existed in 42 cases. Polypi extending into the nasal cavities were seen in 26, into the ethmoid in 3, into the sphenoid in 2 cases. In 13 cases cysts existed in the middle turbinate, with pus in 9. In one case a shoe button had been in the superior meatus for over twenty years, in another a sarcoma, spindle-celled, had destroyed the antrum, ethmoid, and sphenoid. In 4 cases the septum was gone. In 16 cases of frontal-sinus suppuration, 7 were relieved by draining the middle meatus, 4 cleansed through the canula, 6 operated from without with good results in all but one. The treatment of the ethmoid cases lasted for from three weeks to eleven months and longer. The 182 sphenoidal cases were all cured but five.

M. TOEPLITZ.

90. Based on five case-histories. The author presents the optimistic view that in the present state of our science every suppuration of an accessory cavity can be completely healed by a properly performed operation and careful after-treatment in a few weeks.

OPIKOFER.

91. If the suppuration is localized to the ethmoidal bulla, this cell is opened up from the nose. If several or all ethmoidal cells are diseased, the operation is undertaken from the orbit in every case. The cutaneous incision passes along the inner quarter of the orbit; the inner wall of the orbit and the upper

part of the ascending process of the maxillary are resected. Complete recovery in three out of four cases. OPIKOFEK.

92. At the autopsy of this case, numerous abscesses were found in the frontal lobe of the brain after ethmoidal suppuration which had led to diffuse purulent meningitis. One of these abscesses had perforated into the lateral ventricle. The operation, which was performed four months before death, had evacuated one of the abscesses. In conclusion some remarks are made on rhinogenic cerebral abscess. ZARNIKO.

93. This was a cyst of the left frontal sinus, as large as a hen's egg, which had broken through into the orbit and into the ethmoidal cavity. The anterior, lower, and posterior frontal sinus-walls were destroyed; the dura mater was exposed to the extent of a half dollar. The contents were grayish-brown, 54 g in weight, and contained mucin, pseudo-mucin, alkali-albuminate, cholestearin, and fat. The color was due to hämatin. There was no sugar, glycogen, peptone, colloid bodies, or gelatinous substance. WANNER.

94. After discussing the anatomy of the sphenoidal sinus, particularly with reference to its accessibility through the natural opening, the symptoms of the abscess were dwelt upon with special reference to pus and pain, while the objective and ophthalmic symptoms were casually passed over. SOMERS relates the case of a man, aged twenty-eight years, who had almost constantly suffered since his fourteenth year of age from a dull headache, and until the twenty-fourth year from attacks of severe headache, two to three times a week, which then became constant. Thick yellow purulent discharge interchanged by retention of pus with increasing headaches for four years. Pus was seen high up on posterior wall of pharynx coming from the sphenoidal sinus. After the introduction of the probe through the natural opening, much pus escaped and the headaches disappeared for three days, but returned in a milder form. The sinus was washed out. Denuded bone was removed by hook and curette from the anterior wall around the opening. Suppuration then entirely ceased. Resection of middle turbinal is often necessary before catheterization and exploratory puncture. M. TOEPLITZ.

d.—OTHER DISEASES OF THE NOSE.

95. Rusch. The operative treatment of rhinophyma. *Wiener klin. Wochenschr.*, 1902, No. 13.

96. **Fein.** The correction of saddle-shaped noses after injection of paraffine according to Gersuny. *Wiener med. Wochenschr.*, 1902, Nos. 19 and 20.
97. **Smurl.** Subcutaneous injection of solidifying oils to correct a saddle-back nose. *Amer. Med.*, Jan. 31, 1903.
98. **Fein.** Congenital anterior atresia of the nostril. *Wiener klin. Rundschau*, 1902, 9.
99. **Löhnberg.** On coryza. *Wiener klin. Rundschau*, 1902, 31.
100. **Muck.** On certain intermitting conditions of the nasal mucosa and their treatment. *Arch. f. Laryng.*, vol. xiii., p. 457.
101. **Fuchsig.** On abscess of the nasal septum. *Wiener klin. Wochenschr.*, 1903, No. 13.
102. **Schweinburg.** A case of tooth inversion, with perforation of the tooth into the nose. *Wiener med. Presse*, 1902, No. 29.
103. **Fischer.** A case of double-sided lachrymal cyst healed by resection of the lower turbinal. *Arch. f. Laryngol.*, vol. xiii., p. 459.
104. **Gerber.** An unusual foreign body in the nose. *Arch. f. Laryngol.*, vol. xiii., p. 443.
105. **Ephraim.** Remarkable case of sequestra of the nose; with a contribution to the motor innervation of the soft palate. *Arch. f. Laryngol.*, vol. xiii., p. 421.
106. **Dunbar.** Further contribution to the cause and specific cure of hay-fever. *Deutsche med. Wochenschr.*, No. 9, 1903.
107. **Berger.** Gelatine as a hæmostatic, and the treatment of aneurysms. *Wiener med. Wochenschr.*, 1903, No. 11.
108. **Rivière.** Ozena in the suckling. *Lyon médical*, 1903, No. 4.
109. **Goodale.** A contribution to the pathologic histology of syphilitic ethmoiditis. *Journ. Amer. Med. Assoc.*, March 7, 1903.
110. **Theisen.** Nasal syphilis in a child, and a consideration of syphilitic nasal tumors (syphilomata). *Journ. Amer. Med. Assoc.*, Feb. 28, 1903.
111. **Mygind.** Lupus vulgaris of the pharynx. *Arch. f. Laryngol.*, vol. xiii., p. 372.
112. **Glas.** On experiments with thiosinamin in rhinoscleroma. *Wiener klinische Wochenschrift*, 1903, No. 11.
113. **Washburn.** The hemorrhagic diathesis as a factor in the production of hemorrhage following removal of tonsils and adenoids. *N. Y. Med. Journ.*, March 21, 1903.
114. **Mosher.** The use of the Cargile membrane in the nose, in order to prevent adhesions. *Boston Med. and Surg. Journ.*, Feb. 26, 1903.
115. **Gibb.** A case of sarcoma of the maxillary sinus, excision of the upper jaw. *Journ. Amer. Med. Assoc.*, Feb. 21, 1903.

95. After a survey of the literature and the various methods of operation, two cases are reported which were cured by operation. There are in general three methods: (1) wedge-shaped excision with suture in circumscribed lobular hypertrophies; (2) the subcutaneous extirpation of the connective tissue; not to be recommended on account of partial necrosis of the skin flap; (3) decortication with the leaving of a skin base; transplantation is

unnecessary. The most radical method is the total extirpation of the skin of the nose with subsequent transplantation.

The author recommends the decortication under local anæsthesia, leaving a basal part without subsequent transplantation.

WANNER.

96. After describing the various ways of applying the paraffine injections, the author describes his own procedure. White vaseline is sterilized in a water-bath. The injection takes place in that moment where the vaseline begins to harden. The needle, which must be air free, is introduced subcutaneously, but the skin itself must not be injected. The needle should be introduced near the tip of the nose, then shoved under the skin as far as is necessary. During the gradual withdrawal, the injection is made. One can also inject from the root of the nose. During the injection, the skin is raised in a fold. The site of injection is covered with collodium. The local inflammatory signs occurring in the next few days, with swellings which do not completely disappear, show that it is best not to produce an over-effect. After a few days the swelling becomes as hard as cartilage and can no longer be changed in shape. The pictures of three cases are appended; before and after treatment.

WANNER.

97. SMURL uses a metal syringe, three inches long, with a capacity of three ounces, a long and strong needle, but no anæsthetic. Paraffine mixed with red vaseline, 3:1 parts, boiling for one hour, is cooled off, placed in a jar with screw top, cut into fine bits, heated slowly over a spirit lamp, and after injection moulded with the left hand into the desired position.

M. TOEPLITZ.

98. A girl, eighteen years of age, with a saddle-nose. The left nostril enters into a flat, funnel-shaped cavity, which is completely shut off. Incision from above down to the floor of the nose; then a vertical incision to the septum. A piece of bone is removed and covered by a three-corned flap of skin. The nasal breathing was thus restored.

WANNER.

99. What is generally known as an ordinary coryza is not an isolated disease, but the reaction of the nasal mucous membrane to irritation of various kinds, as well local (chronically inflamed diseases of the mucous membrane, anomalies of the nasal skeleton, diseases of the nasal accessory sinuses, chemical and physical irritants, bacterial poisons) as reflex (colds). Conse-

quently there is no one remedy for a cold. The author has tried most remedies without result. The rational treatment is a prophylactic one: strengthening of the natural powers of resistance of the organism by regulating the respiratory function of the nose, and cold baths.

It has struck the reviewer as remarkable that the author frequently has found serous disease of the maxillary antrum and of the anterior ethmoidal cells to exist, and by proper treatment to have prevented recurrent attacks of coryza. ZARNIKO.

100. Small thickenings at the posterior ends of the lower turbinals, as large as peas, may produce unpleasant symptoms by irregular nasal occlusion. The author removes these with aid of the cold snare in the usual manner. ZARNIKO.

101. Two cases are described. The principal cause is traumatism, and the author believes that the tip of the nose is the part usually struck. As in most cases of post-traumatic abscess of the septum, a fracture of the nasal skeleton is absent, the author believes that small fissures of the muco-perichondrial membrane may lead to the formation of a hæmatoma. If this should become infected, an abscess results.

A long interval may exist between the formation of the hæmatoma and the abscess. Further causes are erysipelas, typhoid, smallpox, and the so-called idiopathic perichondritis after infectious diseases.

In conclusion abscesses of the cartilaginous septum may be divided into: (1) traumatic, with or without hæmatoma, (a) rhinogenic or (b) hæmatogenic; (2) not traumatic, (a) rhinogenic, or after rhinitis, erysipelas, (b) metastatic, after infectious diseases.

WANNER.

102. The crown of a tooth was found in the right nasal passage. Right-sided headache, which had existed for nearly twenty years, disappeared after the extraction of the tooth.

WANNER.

103. On both sides of the root of the nose of a man thirty-two years of age there was an elastic fluctuating tumor as large as a hen's egg, with continuous lachrymation, ectropion, and diplopia. On probing the nasal duct, an obstruction was found at the nasal extremity. The anterior and the lower turbinals were resected and the tumor collapsed. The same result came on treating the

other side. The swelling of the mucous membrane of the turbinal had presumably sufficed to completely close the orifice.

ZARNIKO.

104. The patient had introduced a thick rubber tube in his nose for the purpose of getting air. This had slipped back, and in the course of time had eroded the nasal wall of the superior maxilla, and had finally perforated the facial wall. It was surrounded by granulations, and after eight years on examination resembled a malignant neoplasm.

ZARNIKO.

105. A sequestrum in tertiary syphilis was passed anteriorly through the nose, and proved to be a large part of the softened bone containing the Vidian canal. Large destruction of the nasal septum. Internal form of the nose and movements of the palate normal. The author therefore agrees with Rethi that the vagus and not the facial is the motor nerve for the levator veli.

ZARNIKO.

106. Previous investigations have shown that the cause of hay-fever is to be found in the contents of the hay pollen. New investigations have shown that the pollen toxin causes typical attacks of hay-fever in predisposed persons, and the author believes he has produced an immunity by the use of an antitoxin from the blood of animals treated with the pollen toxin.

ZARNIKO.

107. The author employs gelatine externally, by mouth and subcutaneously. In epistaxis he recommends a 10% warm sterilized solution, by means of a nasal douche or irrigator, and gauze dipped in this solution for packing. A 1% to 2% solution is used for injections, though it may be increased from 4% to 5%. The largest amount which was injected was 200ccm. After the injection pain set in, and after two to three hours a chill with fever and a temperature of 40°, which is regarded as a resorptive fever. Without large loss of blood the gelatine does not seem to be efficient.

WANNER.

108. According to the experience of the author, atrophic rhinitis is comparatively frequent in the first year (in $\frac{1}{8}$ of all the cases). He observed a typical case of fetid atrophic rhinitis in a child of eight months and in one of twelve months. Treatment consisted in nasal douches.

OPIKOFER.

109. A man, thirty years of age, with an inflammation of the conjunctiva of the right eye, showed an enlarged right middle tur-

binate. After removal of this cystic enlargement, granulation tissue appeared twice in succession, only to diminish upon administration of mercury and iodide of potassium. The microscopical examination revealed a proliferative periostitis with a new formation of bone in the form of irregular excrescences, in association with a proliferation of the connective tissue in the vicinity of the endothelial cells of the arteries, leaving in places an obstruction of their lumen. These changes are like that of syphiloma.

M. TOEPLITZ.

110. THEISEN has observed three cases of tertiary nasal syphilis, in which the only manifestation of the disease was the presence of tumors in the nose. A boy, aged seven years, had during the past eight months been breathing badly. Both nostrils were completely occluded by tumors springing from the septum about the size of small cherries. Two tumors were in each nostril, one with distinct pedicle, and looked like papilloma, firm to the touch, slightly irregular, grayish. There was externally a small fistulous opening on the cheek, one inch below the lachrymal sac, communicating with it and discharging pus. He was anæmic and had reflex asthma. Both nostrils, thoroughly cleared under ether, filled up again within two months. Potassium of iodide, now given, improved the condition at once, and within two months tumor and asthma disappeared. The growth was made up of round cells, similar to spindle cells, and connective tissue, and showed thickening of vessel-walls. In the second case, a tumor of the size of a walnut, attached to the septum in the right nostril, was found in a man aged thirty-six. There were also tubercle bacilli and giant cells present, besides the characteristics of syphilis. In the third case, a large tumor springing from the inferior turbinate in a man aged fifty-eight, with swelling of the right cheek, was observed, but it disappeared after the administration of potassium iodide.

M. TOEPLITZ.

111. Among 200 cases which had been treated in Finsen's Institute for lupus of the external skin, lupous pharyngeal affections were found in 13 men and 23 women, lupous nodules and scars in the hard palate in 4 women and 4 men. Most patients suffering from pharyngeal lupus are under twenty-five years of age. Men are more affected than women. All were suffering from simultaneous severe facial lupus, which had preceded the onset of the pharyngeal lupus. All presented lupous

scars in the nose, though an extension of the nasal lupus to the pharynx could not be determined. ZARNIKO.

112. In five cases of rhinoscleroma and one case of tertiary syphilis, experiments were made with thiosinamin. A softening of the tissue resulted, so that the passage of a bougie was facilitated. Without mechanical aid the remedy was without result. In rhinoscleromatous stenosis of the nose, the injection of $\frac{1}{4}$ a syringe of 15 % alcohol solution is made four times in the course of two weeks. WANNER.

113. A boy, eight years of age, was operated under ether. Both tonsils were removed with a Mathieu tonsillotome. Profuse bleeding followed the removal of the left tonsil, which was controlled by bimanual pressure. The removal of adenoids with curette and finger was also followed by annoying hemorrhage, which subsided after the second introduction of the curette. Two days after the operation the patient vomited a pint of blood, on the fourth day $1\frac{1}{2}$ pints, followed by jactitation and pulse of 150 beats. The bleeding came from the vault of the pharynx. The final cessation of the hemorrhage with recovery took place on the fifth day after the operation. Seven months later a bleeding from an extracted tooth could not be arrested for three days. M. TOEPLITZ.

114. The Cargile membrane, used for preventing adhesions in abdominal work, is made from the peritoneum of the ox, and looks like gold-beater's foil. It comes sterilized. In the nose the membrane cannot be used in single layers; it has to be folded into a wedge-shaped strip, several layers thick, and then packed firmly between the two cut ends of the adhesion, like calking a seam. M. TOEPLITZ.

115. A man, aged sixty-three, noticed a swelling below the left eye and discharge from the left nostril, with obstructed breathing from this side. After six weeks a mass occupied the entire left nasal cavity, and was reddish, soft, and bleeding. Transillumination confirmed the involvement of the maxillary antrum. The growth increased rapidly, absorbing the hard palate, the anterior wall of the antrum, and appearing on the cheek, with fluctuation felt under the tense and red cheek and in the roof of the mouth. The patient became septic and delirious. After removal of portions of the superior maxilla, the growth was thoroughly removed. Seventeen days later a small nodule ap-

peared on the posterior wall of the antrum, and four weeks later the entire cavity was filled, and the growth projected into the mouth. Ligation of the external carotid and complete excision of the superior maxilla including the floor of the orbit and enlarged glands followed. The patient recovered from the operation, but died four months later. The microscopical examination revealed a giant-cell sarcoma.

M. TOEPLITZ.

c.—ADENOID VEGETATIONS.

116. **Chappell.** A case of adenoids with malaria. *Med. Record*, March 21, 1903.

117. **Wilbert.** On the influence of adenoids on the bodily and mental development of children. *Deutsche med. Wochenschr.*, No. 6, 1903.

116. A baby, healthy at birth, had one month later symptoms of nasal obstruction, which increased until feeding and sleeping were disturbed. When five months old, ten small pieces of lymphoid tissue were removed from the naso-pharynx. After two weeks she became fretful, with increased temperature, rising on the seventh day to 105.5° F. in the afternoon. Five days after adenoid operation, the child had been bitten on the cheek by a mosquito. In the blood the plasmodium malarix of the tertian variety was found. The temperatures continued for four weeks and were finally successfully combated by large doses of quinine (up to 20 gr. daily, in 4 gr. doses). The total amount of quinine given in twenty-seven days was 241 grs.

TOEPLITZ.

117. Three hundred and seventy-five pupils in a school were examined. In 62 % adenoids were present. In 45 % morbid disturbances existed, while in 17 % no symptoms were present.

THIELE.

SOFT PALATE, PHARYNGEAL AND MOUTH CAVITIES.

118. **Damianos and Hermann.** Fatal hemorrhage after tonsillotomy. Formation of a circumscribed gas abscess after subcutaneous injection of gelatine. *Wiener klin. Wochenschr.*, 1902, No. 9.

119. **Petrou.** On the formation of cartilage and bone in the palatal tonsils. *Bolnitschnaja Gazeta Botkina*, 1902, Nos. 38 and 39.

120. **Coen.** The treatment of disturbances of speech in cleft palate. *Wiener med. Wochenschr.*, 1902, No. 17.

121. **Simonin.** Ordinary anginas in the measles of adults. A clinical and bacteriological study. *Arch. internat. d'otologie*, etc., 1903, p. 149.

122. **Suchiko.** On the sites of entrance in the pharynx for tuberculosis. *Berliner klin. Wochenschr.*, 1903, No. 2.

123. **Naumann.** Struma of the root of the tongue. *Verhandlungen der medic. Gesellsch. zu Göteborg*, 1902, p. 63 (*Hygieia*, vol. xiii.).

124. **Lunding-Smith.** A case of accessory struma of the base of the tongue. Treated by transhyoid pharyngotomy. *Nord. med. Arkiv.*, 1902, Abth. i., vol. ii., No. 10.

118. During the last sixty years 150 cases of hemorrhage have been reported, of which 7 were fatal. The authors contribute an additional fatal case.

Hemorrhage occurred after tonsillotomy, which was controlled by application of the Mikulicz-Stoerk compressor. Hemorrhage set in again three days later. The compressor was again applied for twenty-four hours, and a 2 % gelatine solution was injected into the right thigh. On the evening of the following day, after another hemorrhage, the compressor was again applied, and 200 grams of a 2 % gelatine solution were injected into the right thigh. After removal of the instrument on the following morning, there was a bluish discoloration, tender and infiltrated area, posterior to the right angle of the jaw. On the following day a pharyngeal fistula set in, the inner opening being situated in the tonsillar wound, and the outer at the seat of pressure. After three days, swelling at the site of injection in the right thigh. Later on palpation, fluid and gas were found.

After five days, renewed hemorrhage, with the loss of a litre of blood, arrested by digital compression. On the following day the carotid was ligated and the abscess opened. In the course of the afternoon, death under symptoms of syncope, sixteen days after operation. The contents of the abscess revealed the microbe of gangrene foudroyante.

In conclusion the authors warn against a too complete removal of the tonsil.

WANNER.

119. Forty palatal tonsils were examined. They belonged to individuals between seventeen and fifty-eight years of age. In 11 both cartilage and bone were found, in 10 only cartilage, and in 1 only bone.

SACHER.

120. The cause of the disturbance of speech is not due to the communication of the mouth with the naso-pharynx, but the impossibility of bringing the tongue in the proper position to form the necessary sounds. After a proper staphylorrhaphy and appropriate speech gymnastics, an obturator may be dispensed with. The gymnastics consist in vocal exercises, in loud intonation of

vowels, and in massage of the soft palate. Consonants must be produced in an exaggerated form.

WANNER.

121. Measles in adults are complicated, as differing from measles in children, frequently with catarrhal angina (in 531 cases of measles, 45 times). This usually begins on the disappearance of the exanthem, and is usually benign. Most frequently the staphylococcus pyogenes and the staphylococcus aureus were found, especially the pneumococcus or the colon bacillus.

OPIKOFEK.

122. To solve the questions, Is primary tuberculosis of the lingual tonsils rare? and May the follicles of the vallecule epiglotticæ also be affected with primary tuberculosis? the author has examined the bodies of 104 children, and made a microscopic investigation of the palate and the pharyngeal tonsil. Unquestionably primary tuberculosis was not found in a single case. On the contrary, he found secondary disease of the soft palate five times, of the pharyngeal tonsil twice, in the region of the vallecule epiglotticæ and at the base of the tongue once in six cases.

MÜLLER.

123. At the base of the tongue, behind the circumvallate papillæ, there was a soft round tumor covering the epiglottis and the entrance to the larynx. It was removed after an incision from the middle of the inferior maxilla to the thyroid cartilage and a splitting of the hyoid bone. Normal recovery. Microscopically typical glandular tissue with colloid contents.

MÖLLER.

124. A tumor at the base of the tongue which occupied the entire isthmus faucium. The tumor had caused some disturbance in swallowing and in breathing. It was removed by a similar method as in the preceding case. Normal recovery.

MÖLLER.

BOOK REVIEWS.

I.—Operationen am Ohr. By Dr. B. HEINE, First Assistant at the Berlin Ear Clinic. Berlin, 1904, S. Karger, pp. 178. Price 6 Marks.

The book is divided into two parts: operations in suppurations of the middle ear, and operations in otitic intracranial complications. In the first part paracentesis, removal of the ossicles, the simple mastoid operation, the radical mastoid operation, and the opening of the labyrinth are discussed. The second part deals with the operation for epidural and subdural abscesses, the operative treatment of diseases of the venous sinuses, the operative evacuation of brain abscesses, and finally the operations in serous meningitis and in circumscribed and diffuse purulent meningitis. After a short historical introduction, the indications, operation, and after-treatment of each of these procedures are clearly but briefly given.

Dr. Heine's ten years' experience in the Berlin University Ear Clinic has peculiarly fitted him for the task of describing modern otological surgery. This clinic has the largest number of patients and the greatest operative material of any ear clinic in the world. This condition was chiefly due to the tireless energy and pioneer work of Jansen, to whom the author was favored in being fellow-assistant and later successor.

The author is skeptic as to the value of ossiculectomy, and regards this operation to be indicated only in the presence of the following conditions: (1) isolated caries of the ossicles; (2) hearing much reduced; (3) after negative result of expectant treatment. In the treatment of acute mastoiditis the Wilde's incision is no longer practised. One of the most important indications for operation in mastoiditis is sagging of the supero-posterior wall. The duration of an acute otorrhœa for from four to six weeks is not alone a sufficient indication to operate unless the patient is over

forty years of age. Operation after the onset of a facial paralysis depends on the presence of other symptoms of mastoid complication. The antrum is always to be freely exposed unless the inflammation in the tympanum has completely run its course and the drum membrane has resumed its normal appearance.

In the chapter on the radical operation, chronic purulent otitis is divided into dangerous and non-dangerous cases. This distinction is to be made from the site of the perforation in the drum and the character of the discharge. An excellent description is given of the structure of the attic, which is regarded surgically as the most important part of the tympanum. Primary inflammation of the attic unquestionably occurs. When the diagnosis of cholesteatoma is certain, the radical operation is indicated, and the matrix should be carefully removed. In cases of central perforation with muco-purulent discharge, a radical operation would be a mistake ("Kunst-fehler"). The method of operation practised in the Berlin Clinic is Zaufal's. The burr is not used. The indication for the Stacke method is the usual one: inaccessibility of the antrum, or a displaced sinus. The meato-plasty is a slightly modified Stacke. The retro-auricular wound is usually kept open for two weeks. Thiersch's transplantation is only rarely used, as it gives no especial advantage. The length of after-treatment varies between eight and twelve weeks.

The chapter on sinus thrombosis is unusually instructive. For diagnosis the sinus is aspirated with a needle, as being much less dangerous than the incision with a knife. The author is opposed to the routine-removal of healthy-appearing peripheric thrombus masses to provoke a free hemorrhage, as it is regarded as nature's safeguard. Ligation of the jugular vein tends to convert a parietal thrombus into a complete one. If the bulb contains an occluding thrombus which gives pyæmic symptoms, after ligating the jugular the bulb is to be directly exposed and opened. Dr. Heine thinks that the jugular vein should be ligated only for certain definite indications. The collateral tracts and retrograde propagation have not been sufficiently regarded. The ligation may aid extension of the thrombus into the inferior petrosal sinus.

In the treatment of brain abscesses the method of attacking the brain lesion from the ear cavities is preferred as being the more rational. This is supplemented if found necessary by a counter opening through the external surface of the skull. Exploratory

puncture is made with a thick aspirating needle without previously incising the dura. In the after-treatment a heavy drainage tube is inserted.

This admirable treatise of Heine will be read with interest and profit by all that are working in this field. The technique and after-treatment of the various operations are excellently described. The indications are clearly defined and represent a distinctly conservative though modern standpoint. Everywhere we find evidence of the author's extensive experience and sound judgment. Many elementary points are well illustrated, as the author's experience, derived from the giving of courses, has acquainted him with the needs of the otological student. A. K.

II.—Diseases of the Ear, Nose, and Throat. By J. J. KYLE, M.D. Quiz Compend No. 19. P. Blackiston's Son & Co., Philadelphia, 1904. Price 80c. Pp. 280.

In the preface it is stated this compend aims to epitomize briefly the best thought upon diseases of the ear, nose, and throat. This it unquestionably does, and in an admirable manner. It is the best of its kind that we have seen, and can confidently be recommended to students and general practitioners in medicine, for whom the little book is primarily intended.

A. K.

ARCHIVES OF OTOLOGY.

MIDDLE-EAR DISEASE IN ITS RELATION TO METASTATIC ABSCESS OF THE LIVER AND OTHER VISCERA.¹

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THE subject which I have the honor of discussing with you this evening is one, I trust, in which the aurist is not alone in finding interest, and yet it should demand his consideration none the less because of its general medical and surgical associations. As we advance more and more in modern scientific study, freeing ourselves from inherited beliefs or traditional conclusions, we are enabled to break away from that narrow idea of "Specialism," having only to do with that *particular organ* which one may be supposed to "treat." Each part of the body, however small or obscure, undoubtedly exerts, according to its condition of health or disease, some influence toward the perfect or imperfect working of the systemic mechanism.

From the time of Hippocrates there seems to have been a conspiracy of scientists, philosophers, moralists, and humorists against that much-abused organ, *the liver*, stigmatizing it as in some way responsible for all the ills to which flesh is heir; and while the writer may not feel disposed to wholly exonerate that organ, he will, however, attempt to expose a new accomplice in the matter of multiple-abscess dissemination. Indeed, the evidence which he has to present may convict the innocent-appearing organ, the ear, of being in many cases the instigator of the evil done, the infective

¹ Read before the Section on Otology, New York Academy of Medicine, December 10, 1903.

source from which the virile germs set out upon their deadly mission.

It is generally conceded that a suppurative inflammation of the liver can occur only when infective bacteria gain access to that organ; indeed, recent investigation seems conclusive in eliminating the probability of a primary hepatic abscess. But, if the contention that all cases of abscess of the liver have their origin in some other part of the body has been or can be sustained by actual clinical and post-mortem investigation, an interesting question at once arises — what feasible explanation can be given as to the etiologic factors in the so-called “spontaneous abscess of the liver”? All agree that the majority of cases of abscess of the liver are due to infection from either dysentery, appendicitis, suppurating hemorrhoids, gastric ulcer, osteomyelitis, or by metastasis from a similar process involving the lungs, kidney, or spleen. To the mind of the writer it seems quite as conclusive that many of the so-called spontaneous cases are due to a metastatic infection having its origin in the organ of hearing. Thus, while the writer has not been able in his research to find any other such cases recorded, the history of those herein presented will illustrate this point.

CASE 1. — J. W. D., male, aged forty-two, has had a suppurative otitis media extending over a period of twenty-seven years, the original infection complicating an attack of pneumonia. For about twenty years following the spontaneous rupture of the right membrana tympani, the patient suffered no inconvenience except a continued slight discharge from the ear. Then the disease became quiescent and the patient felt that he had been cured, the ultimate outcome of his former condition never having given him any concern except from a cosmetic standpoint. But this immunity was enjoyed for about two years only, when he suffered a relapse, which was characterized by severe pain for two or three days, followed by an offensive reddish-yellow discharge from the meatus, with a simultaneous subsidence of the acute pain. There was marked improvement, however, within a few weeks in regard to both the quantity and quality of the discharge, though at the end of about one year he again suffered from an acute exacerbation, which recurred at frequent intervals during the following three years.

It was while suffering from one of these acute exacerbations, and about three weeks before the patient's death, that the writer saw the case with the attending physician. Briefly, the clinical picture was as follows: After a severe chill the patient's temperature suddenly registered 105.2° F., which was followed by a profuse sweat. The only pain complained of was located in the right shoulder and neck, and was intensified when the patient moved or rested on his left side. A moderate muddy yellowness of the skin was noticeable on close inspection, the conjunctivæ, however, being normal. The aural examination revealed a chronic suppurative otitis media, with entire destruction of the membrana tympani, malleus, and incus; there was no acute-inflammatory condition involving the tympanic cavity or canal, nor did the superior and posterior wall show any evidence of undue redness or drooping. The middle ear was entirely free from any granulation tissue or other pathologic process. Pus was, of course, present, but was small in quantity and quite offensive. On microscopical examination it showed the presence of streptococcus pyogenes, staphylococcus pyogenes albus and aureus, and the pneumococcus. The patient complained of no discomfort whatever about the head, and the mastoid and adjacent parts showed no evidence of involvement. The irregular fever, with chills and sweats, together with an ever-increasing pain in the right shoulder and neck, continued until within one week of his death, when for the first time he also complained of some pain in the right hypochondrium. On examination the attending physician observed distinct enlargement of the liver, with tenderness on pressure, and at the same time a marked increase of the icterus was noted.

The temperature was pyæmic throughout this latter attack, varying from almost normal to 106.6°F. The chills during the last week of his illness were not severe, but his sweats were most profuse, at times saturating the bed-clothing. After the true nature of his illness became manifest, the patient received the most energetic treatment and intelligent care at the hands of his attending physician. Aspiration or other operative interference was not resorted to, the wisdom of which course was afterward sustained by the post-mortem examination. Immediately preceding the patient's death the temperature registered 106° and a fraction, death occurring while in a state of violent convulsions. It is well to state that in connection with various methods of

treatment anti-streptococcic serum was used in full doses with only passing benefit.

The results of the post-mortem were interesting from the fact that every viscus except the liver was found to be normal, *the liver being a mass of miliary abscesses*. The coalescence of some of these minute abscesses formed one cavity about the size of an egg, in the right lobe. An especially interesting part of the patient's history was the incessant, and at times very severe, pain involving the right shoulder and neck. On two separate occasions, the writer felt he was not only justified but that it was his duty to make an exploratory incision to determine the possibility of a thrombosed jugular, notwithstanding all symptoms of such a condition, minus pain and suggestive temperature, were absent. The results of the autopsy demonstrated that the better judgment prevailed. It was also especially interesting to note the normal condition of the mastoid and interior of the skull generally.

CASE 2.—The second case seen by the writer was that of a male, twenty-six years of age. Eight years ago he developed a suppurative otitis media complicating a severe attack of influenza; the discharge continued without interruption, and there was an entire absence of suffering of any kind incident to his ear. Aside from this attack of influenza and the ear complication, he had always enjoyed good health. For about five weeks prior to the time the writer saw this patient, he had been treated for "a low grade of fever," the special characteristics of which were general malaise, disordered digestion, muscular weakness, disturbed sleep, and a slight rise of temperature in the evening. Quite unexpectedly he was taken with a severe pain in the right shoulder, which in a few hours extended into the neck; it was also thought that an increased amount of discharge escaped from his ear, and for this and the pain in the neck the writer was called in consultation. On entering the bedroom the attending physician announced that a slight general jaundice had appeared within the past hour or two. He had also developed a cough, and his temperature rose rather suddenly to 104.2° F. at noon, subsequent to a chill. The ear condition was similar to that of the case first cited, except the character of the discharge

was not so offensive. So also were the other symptoms similar to the first case, with the addition of the chest complication. The patient's temperature was septic, with very marked accessions and remissions, with accompanying chills, death occurring in less than a week.

The *autopsy revealed multiple pus foci in the liver*, as in the former case, together with a similar condition of the lungs. None of the other organs nor the interior of the skull showed any evidence of disease.

Of the four other cases which the writer has seen, similar to the foregoing, only one, and that the most recent, will be reported at this time. Thanks are due to Dr. W. E. Lee and Dr. H. C. Groff, House Surgeons of the Germantown Hospital, for the notes in the following case:

CASE 3.—J. H. P., age twenty years, admitted to Germantown Hospital, April 24, 1903. Occupation, gardener. Habits always good. No alcohol or tobacco used. Family history: Father died when patient was a boy, cause unknown; mother living, mentally deranged; one sister living and well. Patient had measles at four years; no scarlet fever; no diphtheria. Practically always in good health. Following the attack of measles, he developed a discharge from the right ear. The discharge was of the recurrent type, each acute exacerbation being preceded by the usual discomfort, pain, and fever until the suppuration would again start. For six months previous to present attack there was no discharge.

History of present illness: On April 20, 1903, a purulent discharge again appeared, and a physician was consulted who prescribed the use of a solution of carbolic acid to be used in syringing the ear, there being nothing more than a fetid discharge; no pain, no fever, no œdema, no tenderness. April 22d, the same physician, Dr. Geisler, again saw the patient, who at this time complained of severe, constant pain within the head and posterior to the right ear. Temperature at this time 98° F. Pulse 96.

April 23d.—Temperature 99.8°; pulse 96; condition the same.

April 24th.—Temperature 103.6°; pulse 100; constant pain; delirium at times; complains of feeling cold. On this date patient was brought to hospital in ambulance, complaining of con-

stant pain in head, especially about the region of right ear. Pupils equal and reacted to light; patient is fairly well nourished, but very anæmic; discharge from right ear; tenderness on percussion over right mastoid; no swelling; no œdema; no redness; heart and lungs normal; temperature 102° ; pulse 100; respiration 34.

Operation, afternoon of April 24th, by Dr. S. MacCuen Smith.—The mastoid was found markedly necrosed, containing considerable pus and granulation tissue; no evidence of sinus involvement. All necrotic material visible was removed, and cavity drained.

April 25th.—Patient fairly comfortable; complained of but slight discomfort at the seat of operation. Dressing not disturbed.

April 26th.—Temperature 102° ; pulse 88; respiration 24. The dressing was removed and found to be very offensive. Temperature during day rose to 104.4° ; anti-streptococcic serum given, 30,000 units. Complained of pain in side of head and was very restless.

April 27th.—Discharge on dressing, considerable; odor very offensive. Temperature 103° ; pulse 134; respiration 28.

Second Operation, by Dr. S. MacCuen Smith.—The cavity made by first operation thoroughly cleansed; apparently healthy bone removed from front of sigmoid sinus, and sinus found to be thrombosed. The sinus was curetted both ways, until there was free bleeding, and then packed. The cavity was explored in all directions, but nothing further found. Following this operation, temperature dropped to 97° by axilla; pulse 68; respiration 24.

April 28th.—Patient is more comfortable; temperature normal.

April 29th.—No change; dressings renewed.

April 30th.—Dressing removed from lateral sinus; no bleeding; condition same as on previous day.

May 1st.—Temperature 99° ; pulse 72; discharge from ear continues, but quantity is less. Wound washed with formalin, 1:1500, and pure alcohol.

May 4th.—Wound dressed; considerable discharge; dirty yellow pus; chill, with temperature of 105° ; pulse 134; respiration 34.

May 5th.—Septic temperature; complains of pain in shoulders, back, and hip; mastoid dressed.

May 6th.—Condition same as previous day.

May 7th.—Chill to-day, with temperature 106° ; pulse 134;

respiration 34. Ear redressed; large quantity of offensive discharge present. Severe pain on site of wound. Pupils normal; Bovinsky's sign absent. Tongue protruded normally; mentality not affected. Neck drawn backward and muscles rigid. Complaints of severe pain in right shoulder and neck; cannot move head without moving entire body. Secreted seventy-eight ounces of urine in last twenty-four hours.

May 8th.—Same condition; another chill.

May 9th.—Pain in shoulder and neck continues; slight tenderness over jugular vein. Temperature 105° , followed by a chill.

May 10th.—Pain in shoulder and neck continues severe; tenderness over jugular more marked; no swelling or œdema.

May 11th.—A consultation with the surgical staff, Drs. Müller, Deaver, Stewart, Ross, and LeConte, was held. Neck very painful, with marked swelling and œdema. Had two chills, temperature reaching 105° ; pulse 128; respiration 36.

May 12th.—Temperature in morning subnormal; afternoon 104° ; pulse 128; respiration 36.

Third operation, by Drs. MacCuen Smith and Stewart. Lateral sinus opened; blood rather thick, but no thrombus was found. An exploratory incision was made over the jugular, but it was found to be healthy.

May 13th.—More comfortable; pain and tenderness in right shoulder and neck persists. Temperature had reached normal, but rose again.

May 14th.—Two chills, temperature reaching 106.8° ; pulse 148; respiration 48. Great pain in muscles of extremities, neck, and loins. Markedly cyanosed with each chill. Pupils equal; tongue dry and brown; respirations short and labored; râles throughout chest; liver very tender; no jaundice; urine pale and negative.

May 15th.—Mind dull, dozing most of the time; does not complain of pain; little nourishment taken; tongue brown and dry. Dressings changed, no discharge, no odor; packing left in sinus; one chill during day.

May 16th.—Another chill, temperature not as high as on previous days. Nails blue; respirations quick and labored, 46 to 60; râles throughout chest; is delirious; when aroused speaks rationally. Pulse weak and rapid, 160.

May 17th.—Unconscious; skin yellow; conjunctiva yellow; respirations rapid; pulse weak and rapid; temperature falling. Death at 8:30 A M.

Post-Mortem Examination.—Body emaciated; rigor mortis present; skin over the entire body of a saffron color; pupils equal; sclera and conjunctiva yellow. There is an opening in the right mastoid bone, $1\frac{3}{4}$ inches in diameter. The middle-ear and mastoid process of the temporal bone have been opened and curetted. Removing the skull-cap, find the dura is normal, except that portion lining the petrous portion of the temporal bone, which is a dark purple color and thickened. That part covering the opening of the mastoid contains a small opening the size of a pea, beneath which the cortex of the brain exhibits a mottled red appearance. The brain here is black and soft for a distance of half an inch. Otherwise the brain is normal. The sigmoid and lateral sinuses have been removed.

Lungs.—Pleura smooth and glistening; a deep red color; lung tissue sinks when placed in water. *Beneath the pleura* are numerous small cream-colored areas about the size of a mustard seed. On section the *lung* is firm, dark purple in color, and scattered through it are similar cream-colored areas; some as large as a walnut.

Liver.—Weighs 2000g; dark red in color; capsule smooth and glistening; beneath are numerous small cream-colored areas, similar to those found in the lungs. On section, the cut surface is pale, portal spaces distinct, cloudy swelling, and scattered throughout are many small abscesses, similar to those in lung.

Heart.—Normal.

Spleen.—Weighs 250g; capsule smooth and glistening; strips easily; beneath capsule and scattered through the medulla are many yellow areas, similar to those found in lungs and liver.

Kidneys.—Pale; capsule strips readily; no miliary abscesses.

In those cases where more than one viscus was implicated it can readily be understood how the liver could become involved secondarily. But when it is recalled that in two instances the liver alone was involved, and in two additional cases the lungs were also the site of multiple pus foci, we cannot so readily explain the exact *modus operandi* of hepatic metastatic abscess, especially when the lung involvement in these two cases was manifestly secondary to that of the liver. Traumatism was not suspected in any of these cases.

Eichhorst, *Practice of Medicine*, vol. i., page 328, says:

"Any of the vessels of the liver may be the portal of entry for bacteria into the organ. Bacteria can enter the liver through the hepatic veins only by passing in a direction contrary to that of the blood stream. Experimental investigation has shown that corpuscular elements may pass downward in the inferior vena cava, in opposition to the blood stream toward the heart, and enter the hepatic veins, and this phenomenon has been accepted in explanation of cases of suppuration of the liver in which hepatic abscesses have developed in the sequence of inflammation and suppuration of the cranium and at the periphery of the body. At the present day such an assumption is, in our opinion, no longer necessary, if they have gained entrance through the superior vena cava to the right auricle, the right ventricle, and the pulmonary artery, migrate through the pulmonary capillaries, and penetrate the pulmonary veins, the left side of the heart, the aorta, and the hepatic artery. Only if the question arose as to the dissemination of coarse solid particles, would scarcely any other explanation be conceivable, than through the vena cava and thence into the hepatic veins and their ramifications."

Arnold's experiments on dogs (Ziegler's *Pathology*, p. 43) have demonstrated that foreign bodies, small particles of wheat, introduced into the jugular veins, crural veins, longitudinal sinus, and dura mater, and which were too large to pass through the capillaries, were carried by a current running in reverse direction, not only into the trunks, but also into the smallest branches of the veins in the liver, kidneys, heart, extremities, dura and pia mater, also into the orbits, as well as into the post-bronchial veins.

Milligan, in discussing the complications of suppurative otitis media (mostly of the chronic form), asserts that "not only may thrombosis affect the various intracranial sinuses, but minute particles becoming detached may be carried with the blood stream to distant organs, there to set up metastatic abscesses. Such deposits may be found in the lungs, pleuræ, spleen, kidneys, etc." He further quotes several interesting cases seen in consultation with physicians, in one of which "violent septic jaundice developed." Al-

though it is not stated, it is nevertheless highly probable that this patient died either from multiple abscess of the liver, traceable directly to the primary infection in the organ of hearing, or else the liver became secondarily involved from a similar process in a neighboring viscus. At all events, in these cases, as well as those coming under my own observation, it seems clear that the focus of primary infection was located in the temporal bone, regardless of which one of the viscera was first implicated.

In some of the writer's cases it is interesting to note the relatively mild form of the ear disease. In fact, in most of them the ear had received no consideration whatever until attention was directed to that organ by the continued and increasing pain of the right shoulder and neck. With possibly one exception, a largely increased quantity of pus escaped from the meatus; in only three cases, however, did the character of the discharge change to any appreciable extent.

To briefly summarize the most interesting features in this series of unusual cases:

1. The most notable early symptom was the acute exacerbation of a chronic aural discharge, which, although usually innocuous in character, in a few cases became ichorous, and should have pointed suspiciously to a possible systemic infection.

2. The most constant and characteristic symptom was that of *severe pain* in the *right shoulder* and *neck*, which appeared synchronously with the beginning of hepatic suppuration.

3. The manifestation of pain and tenderness in the right hypochondrium unerringly indicated the liver as the seat of disease.

4. The repeated chills, unusually high temperature, and leaky skin demonstrated that the toxic process was septic in character and likely to prove fatal.

5. The marked accessions and remissions of temperature were typical of an acute suppurative hepatitis or multiple abscess of the liver.

6. While jaundice was a constant factor, it appeared so

irregularly as to be of little diagnostic value, save in a confirmatory way.

7. The history of secondary infection in each of these cases is sufficiently clear to warrant the conclusion that a metastatic abscess of the liver, or other viscera, may originate from a suppurative disease of the ear.

A CONTRIBUTION TO THE PATHOLOGICAL ANATOMY OF THE INTERNAL EAR AND THE AUDITORY NERVE.

BY PROFESSOR PAUL MANASSE, STRASSBURG, GERMANY.

Abridged Translation by Dr. ADOLPH O. PFINGST, Louisville, Ky.

(With Plates I. and II., *Zeitschrift f. Ohrenheilk.*, Vol. XLIV.)

DISEASE of the labyrinth and the eighth nerve has been divided into the primary affections and those occurring secondary to other affections. The latter are by far the most common, and are nearly always the result of an extension of the inflammation from the middle ear. Disregarding for the present those cases resulting from acute inflammations of the middle-ear, I will include in this report seven cases of labyrinth disease complicating chronic middle-ear diseases. Steinbruegge (1), who was one of the first to describe affections of the internal ear, made no distinction between primary and secondary cases, and merely mentioned the frequency of the extension of the disease from the tympanum. Habermann (2), in a later publication, differentiated between the cases accompanying acute and those complicating chronic middle-ear inflammations. According to his observation, the internal ear was affected more frequently in the acute than in the chronic cases. In his experience, disease in the internal ear involved principally the first turn of the cochlea, causing fibrous adhesions, calcareous degeneration, bony developments, and nerve atrophy. Mygind (3 and 4) observed similar changes in the cochlea, and Moos (5) in the vestibule of deaf-and-dumb

children. All of their cases had, during life, been subjects of chronic purulent otitis media. The pathological changes in all of these early cases were described only from a microscopic standpoint. Panse (6) reported five similar cases, and was probably the first to include microscopic findings in his report. The subject offers a good field for further microscopic research.

CASE 1.—Age twenty-four; history of chronic O. M. P. on the right side, was subjected to operation on account of general symptoms of brain abscess, viz.: headache, slow pulse (64), moderately high temperature, and choked disc. The tympanic cavity and the antrum were found full of muco-pus, and were thoroughly cleansed. Subsequently the middle and posterior cranial fossæ of the skull were exposed, and repeated puncture made into the temporal lobe and the cerebellum without finding pus. Death followed in five days.

The autopsy revealed the following conditions: The drum was very much thickened, and was marked by a perforation extending across Schrapnell's membrane. The edges of the perforation were covered with squamous epithelium in several layers. The periosteum and submucous tissue of the tympanum were replaced by granulation tissue, which, however, was covered by the normal columnar epithelial lining of the cavity. The interior of the cavity was filled with pus. The bone under the granulation tissue was rough and portions of it replaced by granulation tissue. Typical Howship's lacunæ containing osteoclasts were observed in the depressions. In the attic, just inside of the perforation in the drum, a cholesteatomatous mass, about the size of a mustard seed, was found, surrounded by granulation tissue. It had a fibrous capsule, lined on both sides with stratified squamous epithelium, and contained in its interior desquamated horny epithelial cells and typical lamellæ of cholesteatoma. A strand of squamous epithelial tissue in several strata extended from the perforation in the drum to the wall of this body.

Examination of the ossicles showed that the greater portion of the foot-plate of the stapes had undergone necrosis as well as portions of the crura. The bone had been replaced by granulation tissue, which extended through the fenestra ovale into the vestibule. The bony edges of the fenestra were rough and irregular. The entire vestibule was filled with a mass which was

made up in its interior of granulation tissue, and close to the bony wall contained new connective tissue, well supplied with cellular elements. Proliferation of the adjacent bone was indicated by the presence of new osseous trabeculæ lined with osteoblasts.

The osseous semicircular canals were not involved, but the lumen of the membranous portion was almost completely filled out with newly formed connective tissue. Only at intervals the lumen could be made out. It was lined with epithelium and filled with a gelatinous hyaline material.

The cochlea was also the seat of extensive changes. With the exception of a small portion of the last turn the entire membranous cochlea was filled with a white, rather dense mass. The microscope showed that the tissue in the first turn was a very cellular granulation tissue, in which an occasional strand of white fibrous tissue was visible, in proximity to the osseous wall. Not a vestige of Corti's organ, Reissner's membrane, the basilar membrane, or the lamina spirale ossea could be found. The changes in the second turn, although similar, were less extensive than those of the basilar turn. The lamina spirale ossea and a portion of the organ of Corti were still intact. In the last turn the changes were still less marked, tissue of the kind present in the rest of the canal being found only in the scala tympani, which was completely filled with it. In the scala vestibuli and scala media there was no granulation tissue, but these spaces, as well as the aqueductus cochleæ, were filled with a peculiar colorless, glassy, hyaline material, entirely devoid of cellular and fibrous elements. Reissner's and Corti's membranes were absent, as was also the epithelial lining of the scala and the ligamentum spirale. Corti's organ was intact and almost normal. The ganglion spirale was partially replaced by granulations and hyaline material.

The auditory nerve was very much enlarged and filled up almost the entire internal auditory canal. Microscopically, the cause of its enlargement was seen in a cellular infiltration between the nerve fibres. In addition there was some hyaline material which contained a few round cells. In some portions of the nerve trunk the nerve substance had been replaced by fibrous tissue. The facial nerve was surrounded and partly infiltrated by similar tissue. In following the auditory nerve inwards, it was observed that as it approached the labyrinth it became more and more normal, although its fibres were separated by the

interposition of round cells and hyaline material, resembling the tissue in the canal of the cochlea, as far as its termination.

Reviewing this case briefly, we find the following points of especial interest: in the tympanic cavity, the presence of normal epithelial lining, or rather the absence of squamous epithelium, with the exception of that lining the perforation in the drum, and the narrow epithelial pedicle stretching from the edge of the perforation to the cholesteatomatous mass. These conditions indicate plainly an inward growth of the epidermis, terminating in the development of a cholesteatoma. It exemplifies the theory of Habermann-Bezold of the development of cholesteatoma. It showed beautifully the continuity of the epidermis with the cholesteatoma through the narrow bridge of tissue, and also excluded the possibility of development of the cholesteatoma from the intratympanic epithelium, which was entirely columnar.

The extensive necrosis of bone in and about the tympanum, encroaching upon the internal ear at the pyramid, and the invasion of the vestibule by granulation tissue through the foramen ovale, were other noteworthy features of this case.

In the internal ear, the mass of granulation tissue in the vestibule and most of the cochlea, and the hyaline material in the cochlea, vestibule, and between the fibres of the auditory nerve, were features of more than usual interest. The exudate in the upper part of the cochlea and in part of the nerve was structureless and transparent, resembling the matrix of hyaline cartilage. It contained a sparse amount of cellular tissue and some new blood-vessels. The material found in the other portions of the internal ear was organized tissue and was looked upon as a hyaline connective-tissue.

CASE 2.—A specimen removed from a subject who had been afflicted with O. M. P. Chron. Cause of otitis, clinical history, and cause of death not ascertained.

Microscopically the drum membrane and the ossicles had apparently been entirely destroyed. The auditory nerve was very much thickened and, with the facial nerve, filled out the entire

internal auditory meatus. The fenestra ovale was blocked with a white, rather firm mass. The cochlear canal contained similar material. The mass extending through the oval window was made up histologically of typical granulation tissue and could be traced from the tympanum into the vestibule. A portion of it was made up of vascular connective-tissue between the fibres of which stellate and spheroidal cells were deposited. A sharp line of division could not be made between this and the granulation tissue. The membranous vestibule had been entirely destroyed and the cavity filled, partly with an organized mass and partly with inspissated pus and a granular material in which small fragments of bone were visible, evidently remnants of the stapes. The granulation tissue in parts encroached upon the bone, extending into its interior and thereby forming pits separated by projecting spiculæ of bone. The pits contained, besides granulation tissue, typical Howship's lacunæ and osteoclasts. The changes in the semicircular canals were identical with those of the vestibule; there was an absence of the membranous portion, and their lumen was filled with granulation tissue and pus. Invasion of the bone had also taken place.

The process in the cochlea, although extensive, had not involved the bone. The membranous portion had been almost completely destroyed, no vestige of Corti's organ or of the epithelial lining remaining intact. The scalæ contained masses of inspissated pus and some granulation tissue, but no organized fibrous structure like that found in the vestibule. Rosenthal's canal was almost entirely filled with granulation tissue and pus, leaving only portions of the spiral ganglion intact.

The internal auditory canal was tightly filled with a cord made up of the auditory and facial nerves and the periosteal lining. The trunk of the auditory nerve was made up largely of a vascular connective-tissue, between the strands of which deposits of calcium salts were visible. More centrally it was in a more normal condition. Groups of round cells between the nerve fibres were the only indication of inflammation. Toward the labyrinth, erosion of the bone had taken place. Osteoclasts and Howship's lacunæ were abundant.

The interesting feature of this case was the relation of the pathological changes in the different parts to the time of exposure to the inflammatory process. In the tympanic

cavity, where we must assume the origin of the disturbance and where the process had consequently lasted longest, the changes were proportionately extensive. They were less marked in the vestibule, still less in the cochlea, and least in the auditory nerve where the evidences of inflammation diminished as the nerve approached its central end.

This case resembled the first case in the extension of the inflammatory process from the tympanum to the internal ear through the fenestra ovalis, after destruction of the foot-plate of the stapes. There was also similarity of the pathological process in the labyrinth. The cases differed only in the nature of the changes in the bone. In the first there was a tendency to the formation of new bone, while in the other degenerative and resorption processes predominated.

CASE 3.—Aged forty; otorrhœa on right side since childhood; deaf and dumb for six years; acute symptoms with vomiting for three weeks. Removal of granulations and cholesteatoma from the tympanic cavity with no relief of symptoms; mastoid operation; death four days later.

Post-Mortem Findings: Marked thickening of the mucous membrane of the middle ear; covering of stratified flattened cells, the most superficial horny and supporting large lamellæ of cholesteatoma. The stapes was absent, and in its place a mass of granulation tissue projecting through the fenestra ovale into the vestibule. The membranous cochlea was also absent, granulation tissue and a finely granular material filling up the canal. In some portions there were newly formed lamellæ of bone arranged in a wide mesh. The trabeculæ contained rudimentary lacunæ without bone corpuscles. The bony walls of the tympanic cavity showed evidences of resorption.

The auditory nerve was the seat of marked pathological changes. Instead of the usual division at the entrance into the labyrinth, it appeared as a fibrous cord, the intervening lamellæ of bone having been absorbed. The trunk of the nerve instead of being made up of nerve fibres was one mass of granulation tissue.

Isolated fragments of nerve fibres were scattered through this tissue. Portions of the nerve tissue had been transformed into fibrous cords. In some places the connective tissue was made up of very fine fibres and contained but few connective-

tissue corpuscles. This tissue was exceptionally vascular and the fibres were arranged in a coarse reticulum. In other portions the fibres formed a closer mesh and the interstices were packed with round cells. Many of these cells were polynuclear, some containing as high as 18 nuclei.

We had to deal in this case with chronic otitis media with secondary cholesteatomatous formation and involvement of the labyrinth. As in the previous cases the avenue of extension of the disease from the middle to the internal ear was the foramen ovale. The pathological changes in the internal ear were more extensive than in the preceding cases, the membranous portion being almost completely destroyed and the bone extensively eroded.

The most marked changes were found in the auditory nerve, and were evidently the result of a chronic interstitial neuritis. The inflammatory process was evidenced in the excessive development of fibrous connective-tissue and the infiltration of the trunk with round cells. In the portion of the nerve in which the cellular elements predominated, the small amount of fibrous structure entered into the formation of a reticulum, or framework, for the mass of cells. The latter were of a peculiar variety. But few of them were of the stellate variety usually present in connective tissue, the mass between the fibrous meshes consisting of rather large round cells, most of them polynuclear. The bodies of the largest cells were marked by lines dividing them into compartments. In most of the cells the protoplasm contained vacuoles and a few of them had become vesicular. In the small cells the nuclei were situated excentrically, while in the larger ones the nuclei, which numbered as high as 18 to a cell, were crowded together in the centre of the protoplasm. The markings of the cells, already alluded to, extended in a radiating manner from this group of nuclei to the periphery. (See Fig. 4.)

Peculiar cells of this variety have been described by Langhans (7) and his followers in cachexia thyreopriva. They were described as large vesicular cells with little or no protoplasm, and marked by trabeculæ extending from

the cell wall into the interior of the cell and dividing it into a variable number of compartments. The nuclei were situated just inside the cell wall, each cell containing from 1 to 3 nuclei. The cells were believed to originate in the endothelial cells inside the primitive sheaths of the nerve fibres. Kopp (8), Weiss (9), and other investigators observed similar vesicular nucleated cells in the nerves of lower animals, particularly in dogs, and looked upon them as endothelial growths arising in the endoneurium and perineurium. These authors found cells with from 1 to 3 nuclei. None of them described large multinuclear cells as they were found in my case.

CASE 4.—Age forty-five ; right O. M. P. Chron. ; abscess of neck ; radical operation ; abscess of right temporal lobe ; meningitis ; death.

Microscopic examination revealed a thin coating of pus and granulation tissue over the bone of the tympanic cavity. The plate of the stapes was dislocated slightly towards the vestibule, and was fissured transversely, but showed no evidences of a necrotic process. The bone at the posterior and upper border of the fenestra ovalis was also marked by a breach in its continuity, extending from the tympanic cavity to the vestibule. The edges of the bone were apparently normal and made the impression of a fracture rather than a result of a necrotic process. The cleft was filled with a finely granular coagulated material and pus. There was no evidence of granulation tissue either in this fissure or in the breach in the stapes. The vestibular epithelium was nowhere recognizable. It was replaced by a coating of granular, partly lumpy material. The periosteal lining was thickened by the formation of new connective tissue and the infiltration of round cells, and was firmly adherent to the bone. These changes were more marked in some areas than others, forming nodules on the surface. A few small areas were seen where the fibrous membrane was entirely absent, and the bone covered directly with a granular material containing a few pus cells. Similar changes were found in the semi-circular canals. The membrane of the fenestra ovalis was

intact, but was covered on both sides with clotted fibrin and pus.

In the cochlea the scala tympani contained coagulated masses made up of pus cells in a meshwork of fibrin, especially on the lower wall of the canal. The epithelial lining of the cochlea was partially destroyed. A portion of it was normal, and in some portions the cells were enlarged and cystoid. The scala vestibuli was practically normal. In the ductus cochlearis the epithelium over the spiral ligament was thickened by an increase in number and size of the cells.

In this case the nerve was again the seat of the most extensive changes. In the trunk as well as in the branches of the nerve, large accumulations of variously shaped cells, from oval to triangular, were found deposited between the fibres. The cells were peculiar in their structure. They were rather large and had a well-defined cell membrane, with clear, colorless contents, which was divided into one or more compartments by delicate partitions arising from the capsule and coming together at the nucleus, which was usually situated close to the cell wall. Most of the cells had a single nucleus, although many were seen with two nuclei.

It is of interest to note in this case, as in the previous one, the point of infection of the internal ear at the oval window. However, not by the inward growth of granulation tissue and necrosis of bone, as in the previous cases, but by the extension of a suppurative process through a breach in the bone, the latter, most likely, a fracture sustained during the operation. The preponderance of a purulent process with epithelial destruction, and the formation of granular material, and but little tendency to the formation of granulation tissue, were the prominent features of this case. Evidence of an old inflammatory process, with formation of new connective tissue was found only in the semicircular canals and the vestibule.

The changes in the nerve were evidently the product of a recent inflammatory process, as there was no new connective tissue to indicate an extended inflammation. The peculiar cells found in the nerve trunk resembled those of the previous case, though they were uniformly smaller and contained

a smaller number of nuclei. The early appearance of these cells, before the formation of fibrous tissue, is of interest.

CASE 5.—Age thirty-seven ; cholesteatoma of right middle ear ; cerebellar abscess ; operation ; death.

Sections of the tympanic cavity disclosed a thick coating of its walls, made up of a cholesteatomatous formation containing numerous cysts, many of which contained giant cells.

The *scalæ* of the cochlea, the ductus cochlearis, and the separating membranes were all coated with a peculiar granular material containing isolated large nuclei. It was thickest over the *ligamentum spirale*, where it formed a nodular elevation. Peculiar and characteristic changes had also taken place on the basilar membrane. Corti's organ was entirely replaced by a mass made up of a great number of small irregularly oval or round hyaline bodies. They were closely crowded, and filled the space between the basilar membrane and the membrane of Corti. The oval bodies were homogeneous in their make-up, only a few of them containing nuclei in their centre. Round cells in mass were found at only one point in the internal ear, the space at the extremity of the angle between Reissner's and Corti's membranes being filled with them.

In this case the acoustic nerve was again the scene of extensive changes, more so in the cochlear than in the vestibular division. The fibres were crowded apart by the deposit of a finely granular material containing numerous round cells and extravasations of blood. In some portions of the nerve the individual fibres were separated and in others the bundles. These changes could be traced far into the trunk of the nerve. It was noticed that the newly formed material was most abundant around the blood-vessels. The smaller branches of the nerve in the labyrinth were surrounded by a light hyaline material, which was contiguous with the surrounding bone.

A significant anatomical feature of this case was the abundance of hyaline and finely granular deposit in the labyrinth and the absence of pus or granulation tissue, with the exception of the small quantity in the angle between Reissner's and Corti's membranes, indicating clearly a degenerative process. The infiltration of the nerve with round cells was indicative of a neuritis; and the absence of fibrous formation, of the acuteness of the inflammatory process.

The peculiar hyaline globular bodies on the basilar membrane can be explained by a hyaline degeneration of the cells of Corti's organ, as none of the normal cells remained, and as a number of the bodies contained nuclei. They were found at no other portion of the inner ear.

CASE 6.—A temporal bone, preserved in alcohol for operative practice, showed signs of an old purulent otitis and was decalcified and prepared for microscopic study.

The mucous membrane of the middle ear was very much thickened by an unusually prolific formation of fibrous tissue and cell infiltration in the submucous coat. The surface was covered by the normal, well-preserved columnar epithelium.

The only abnormalities noted in the internal ear were in the cochlea. There was a very thin deposit of finely granular matter on the epithelial lining of all of the compartments of the spiral canal, and the spiral ligament was marked throughout its course by a nodular protuberance. Histologically this swelling was the result of changes in the histological structure of the sub-epithelial tissue. There had been a proliferation of the connective tissue of the spiral ligament, which protruded into the ductus cochleariformis, pushing before it the normal epithelium of the surface. The changes in the scala media in this case were similar to those of the previous one, and must be construed as the result of a circumscribed inflammation of the connective-tissue stroma of the spiral ligament.

CASE 7.—Male of thirty-six years ; was first seen in an advanced stage of pulmonary phthisis. He had otorrhœa on the left side, with sagging of the posterior superior wall of the meatus, and exuberant granulation tissue filling the tympanic cavity. Hearing on this side had been destroyed. In addition to this there was total paralysis of the left facial nerve. In standing with his eyes closed, the patient would show a tendency to fall to the affected side. The tubercular process had also involved the buccal cavity and larynx. Owing to his feeble condition, operative measures were not advised. Death followed a month later.

At the autopsy it was found that the dura on the left side, corresponding to the second turn of the cochlea, contained two small

white deposits, evidently of a tubercular nature. The pia mater on the left side also contained tubercular deposits, especially in the middle cranial fossa. The anterior surface of the petrous bone was marked by several discolored areas over which the dura was perforated. The surface of the occipital lobe and the cerebellum, on the left side, was covered in parts with a thin deposit of foul pus. Tubercular deposits were also found in the respiratory tract, the spleen, and the kidneys.

Microscopic Examination.—In the tympanic cavity the mucous membrane was entirely absent, the naked bone being exposed in parts, and a large extent of the surface covered with granulation tissue. A few masses of granular material, with central giant cells, were also found in contact with the bone. The greatest part of the bone surface was irregularly pitted and covered with pus, finely granular material and fragments of necrotic bone. The ossicles, with the exception of a small fragment of the footplate of the stapes, were absent. They were replaced by granulation tissue, intermingled with a granular, apparently cheesy, material. This partially degenerated granulation tissue could be traced into the vestibule through a rather large irregular defect in the bone just behind and communicating with the fenestra ovale. It formed a coating over the rough bony edges of the perforation. The tissue was extremely vascular and contained some connective-tissue fibres. Toward the interior of the vestibule it became more caseous, and contained a number of giant cells. It occupied only a small portion of the cavity, the entire mucous membrane being intact. However, a marked proliferation and hyaline degeneration of the epithelial cells had caused thickening of the membrane. The peri- and endo-lymphatic spaces contained a semi-solid transparent hyaline exudate. In the course of the horizontal semicircular canal a small necrotic area was found, the breach in the bone being occupied by granulation tissue. The changes in the membranous semicircular canals differed in their different portions. Some sections would show complete occlusion of the lumen, with a cheesy mass and granulation tissue, while other portions contained circumscribed nodules, with broken-down interior (tubercles). Other sections, again, showed involvement of the bone. The surface was ragged, and the niches filled in with granulation tissue. Some of the larger necrotic areas were crescentic in shape and contained, besides the round cells of granulation tissue, a number of osteo-

blasts. In some portions of the canals normal epithelial lining was present, only slightly thickened by an increase of its fibrous elements. In these portions the lumen contained a glassy hyaline material.

In the cochlea, products of an inflammatory process were noticed only on a small portion of the basilar membrane, and in the scala tympani. The latter was filled with a colorless homogeneous hyaline substance in which isolated delicate fibres could be detected. Towards the bone there was some granulation tissue, and in direct contact with the bone and filling out its irregularities, a mass of finely granular material, probably of a cheesy nature. At the posterior edge of the foramen rotundum there was a rather large necrotic area in the bone, and the membrane of the fenestra was replaced by a cushion of granulation tissue, which had partly undergone cheesy degeneration. The basilar membrane with Corti's organ had been replaced by similar tissue.

The auditory nerve showed no pathological changes ; but the facial was extensively involved. It was detached from its surrounding bony wall, and its fibres separated by some granulation tissue and more cheesy material, in which irregular round nodes, evidently tubercles, could be seen.

Analysis of Findings.—This case was clearly one of tuberculosis. Diagnosed as tuberculosis of the tympanum during life, it was corroborated by the macroscopic findings at the autopsy, and by the microscopic examination. The extensive destruction of bone in the ear, in addition to evidence of tuberculosis in other portions of the body, was enough to make the diagnosis ; but there was in addition to this the typical cheesy degeneration and the isolated tubercular nodes.

The disease had spread from the tympanic cavity to the internal ear through necrotic areas in the bone around both fenestræ and in the horizontal semicircular canal.

The slight changes in the internal ear is a fact worthy of special note. At each of the avenues of infection the disease extended over but a slight area, the more central portion of the internal ear, including the auditory nerve, showing little evidence of inflammation.

The involvement of the facial nerve is another interesting

Fig. 1.



Fig. 2.

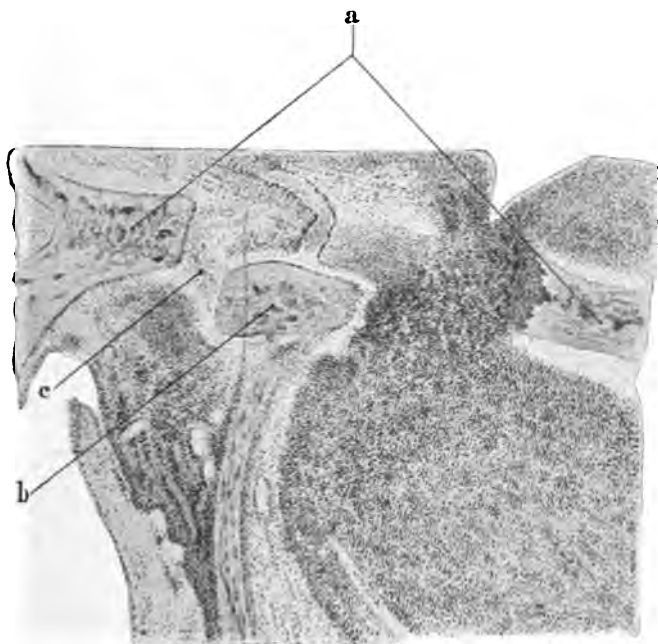
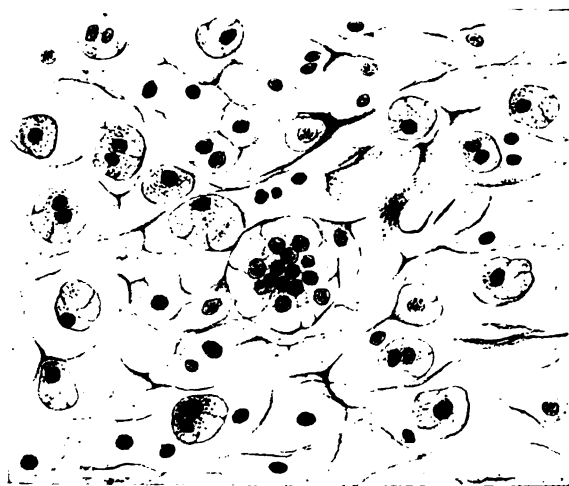


Fig. 3.



Fig. 4.



feature of this case. The changes were partly the product of a recent inflammation, and in portions were easily recognizable as tubercular. The fact that they were most marked where the nerve passed through the tympanum, leads to the conclusion that the infection of the nerve took place at that point.

Although necrosis of bone was noted in the other or simple cases of otorrhœa, they were characterized more by a proliferation of tissue. In most of them there was an abundance of fibrous-tissue formation and the formation of new bone. In the last or tubercular case there was no tendency to the formation of new bone, and the newly formed fibrous tissue was scant, and was mostly transformed into cheesy material.

It might be stated that Habermann has previously made the observation that tubercular cases could be recognized by their great tendency to bone destruction.

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Description of Plates.

- Fig. 1, Case 1. Section through cochlea and nerve.
- Fig. 2. The same case. Perforation through stapes: (a) margin of window posteriorly normal, anteriorly carious; (b) stapes, posterior part of the plate with posterior branch; (c) annular ligament.
- Fig. 3. The same case. Semicircular canal. Bony canal is occluded with hyaline, vascular connective-tissue; the membranous canal in the upper and right-hand corner as a very small epithelial tube filled with hyaline material.
- Fig. 4, Case 3. A cellular part of the auditory nerve.

CONTRIBUTION TO THE PATHOLOGY AND
TREATMENT OF DISEASES OF THE AC-
CESSORY NASAL CAVITIES.

BY DR. F. ROEPKE, OF SOLINGEN.

Translated by Dr. ARNOLD KNAPP, of New York.

1.—Three cases of caseated empyema of the accessory sinuses.

a.—Of the Ethmoid Cells.

In November, 1893, S. P., thirty-five years of age, consulted me on account of a fetid discharge from the right nostril, a dull pressure in the head, occasional vertigo, and spots before the eyes. His complaint interfered considerably with his work, and though he had formerly been a man of very passive disposition, he had recently become unusually irritable and had had a number of misunderstandings with his fellow-workmen. The right side of the nose, in its upper part, was filled with granulations and fetid pus. After the granulations had been removed a white cheesy mass occupied the middle meatus. The probe detected that the ethmoid cells bordering on the naso-frontal duct were filled with this mass. The cheesy masses were removed with a sharp curette. A cavity as large as a walnut was thereby exposed and carefully packed with iodoform gauze. The suppuration ceased after two weeks and the patient was free from all symptoms. A half year later he returned; the condition had remained healed.

Mrs. B., seventy-three years of age, consulted me in July, 1900, on account of severe headache and occlusion of the right nose. After having removed the polypi, which completely occluded the right half of the nose, the unusually dilated atrophic nasal cavity on that side was found to be filled with cheesy yellowish-white masses. The masses were curetted and were very

fetid. After irrigating the nose, the probe detected that a cavity existed in the anterior ethmoid cells. The walls of this cavity were covered with granulations. After their removal recovery quickly followed.

b.—Of the Maxillary Antrum.

W. J., thirty-six years of age, consulted me at the end of September, 1900. He had suffered from a discharge of pus from the right side of his nose for five years, together with a sense of pressure in the right cheek and occasional attacks of vertigo. During the past month the symptoms had become very much aggravated, the headache had become almost unbearable. The right half of the face had been swollen for a week, and there was a continuous discharge of fetid pus from the right nostril. The patient was an emaciated man, with a very unpleasant odor. The region of the right maxillary antrum was swollen and tender; over the right nasal bone there was a small fluctuating tumor; the right nasal cavity was filled with granulations and inspissated pus. After removing the granulations, the lateral wall of the nose was found to be carious. On account of the severe symptoms, the superior maxillary cavity was opened on the same day. A broad opening was made through the canine fossa. The anterior wall was found very thin, the entire cavity completely filled with cheesy, bad-smelling, yellowish-white masses, which were removed with the curette. The lateral wall of the nose is badly necrosed and covered with granulations. The other walls presented uniform thickened mucous membrane. The necrotic part of the lateral wall was removed with bone forceps and granulations carefully curetted. The abscess on the right nasal bone was opened and a small sequestrum evacuated. Microscopically, the cheesy contents of the maxillary cavity consisted of amorphous masses without any epithelial structures. Usually, after treatment granulations had to be removed from the middle meatus. Otherwise recovery took place without incident. After four weeks, the large cavity was dry, the small abscess wound was healed. The patient himself irrigates the cavity, and would not permit the opening in the canine fossa to close for fear of a recurrence. Six months ago I had occasion to examine the patient again. The opening in the upper jaw was large enough to admit your small finger; the cavity was entirely healthy, and there has been no further discharge from the nose.

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Microscopic Examination.—In the tympanic cavity the mucous membrane was entirely absent, the naked bone being exposed in parts, and a large extent of the surface covered with granulation tissue. A few masses of granular material, with central giant cells, were also found in contact with the bone. The greatest part of the bone surface was irregularly pitted and covered with pus, finely granular material and fragments of necrotic bone. The ossicles, with the exception of a small fragment of the footplate of the stapes, were absent. They were replaced by granulation tissue, intermingled with a granular, apparently cheesy, material. This partially degenerated granulation tissue could be traced into the vestibule through a rather large irregular defect in the bone just behind and communicating with the fenestra ovale. It formed a coating over the rough bony edges of the perforation. The tissue was extremely vascular and contained some connective-tissue fibres. Toward the interior of the vestibule it became more caseous, and contained a number of giant cells. It occupied only a small portion of the cavity, the entire mucous membrane being intact. However, a marked proliferation and hyaline degeneration of the epithelial cells had caused thickening of the membrane. The peri- and endo-lymphatic spaces contained a semi-solid transparent hyaline exudate. In the course of the horizontal semicircular canal a small necrotic area was found, the breach in the bone being occupied by granulation tissue. The changes in the membranous semicircular canals differed in their different portions. Some sections would show complete occlusion of the lumen, with a cheesy mass and granulation tissue, while other portions contained circumscribed nodules, with broken-down interior (tubercles). Other sections, again, showed involvement of the bone. The surface was ragged, and the niches filled in with granulation tissue. Some of the larger necrotic areas were crescentic in shape and contained, besides the round cells of granulation tissue, a number of osteo-

blasts. In some portions of the canals normal epithelial lining was present, only slightly thickened by an increase of its fibrous elements. In these portions the lumen contained a glassy hyaline material.

In the cochlea, products of an inflammatory process were noticed only on a small portion of the basilar membrane, and in the scala tympani. The latter was filled with a colorless homogeneous hyaline substance in which isolated delicate fibres could be detected. Towards the bone there was some granulation tissue, and in direct contact with the bone and filling out its irregularities, a mass of finely granular material, probably of a cheesy nature. At the posterior edge of the foramen rotundum there was a rather large necrotic area in the bone, and the membrane of the fenestra was replaced by a cushion of granulation tissue, which had partly undergone cheesy degeneration. The basilar membrane with Corti's organ had been replaced by similar tissue.

The auditory nerve showed no pathological changes; but the facial was extensively involved. It was detached from its surrounding bony wall, and its fibres separated by some granulation tissue and more cheesy material, in which irregular round nodes, evidently tubercles, could be seen.

Analysis of Findings.—This case was clearly one of tuberculosis. Diagnosed as tuberculosis of the tympanum during life, it was corroborated by the macroscopic findings at the autopsy, and by the microscopic examination. The extensive destruction of bone in the ear, in addition to evidence of tuberculosis in other portions of the body, was enough to make the diagnosis; but there was in addition to this the typical cheesy degeneration and the isolated tubercular nodes.

The disease had spread from the tympanic cavity to the internal ear through necrotic areas in the bone around both fenestræ and in the horizontal semicircular canal.

The slight changes in the internal ear is a fact worthy of special note. At each of the avenues of infection the disease extended over but a slight area, the more central portion of the internal ear, including the auditory nerve, showing little evidence of inflammation.

The involvement of the facial nerve is another interesting

Fig. 1.



Fig. 2.

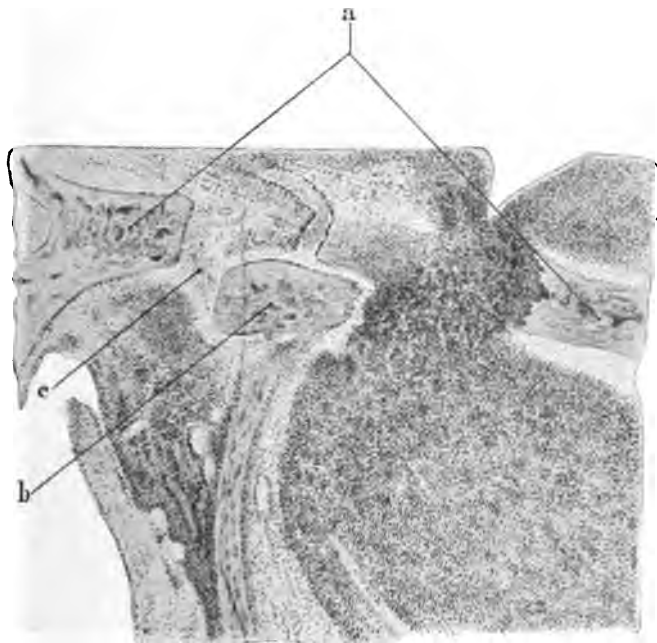
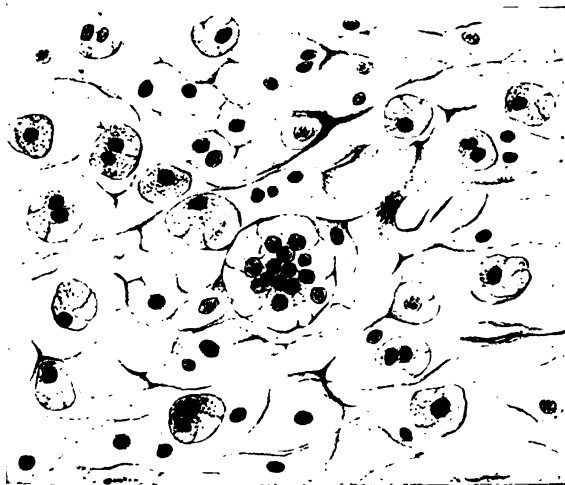


Fig. 3.



Fig. 4.



feature of this case. The changes were partly the product of a recent inflammation, and in portions were easily recognizable as tubercular. The fact that they were most marked where the nerve passed through the tympanum, leads to the conclusion that the infection of the nerve took place at that point.

Although necrosis of bone was noted in the other or simple cases of otorrhœa, they were characterized more by a proliferation of tissue. In most of them there was an abundance of fibrous-tissue formation and the formation of new bone. In the last or tubercular case there was no tendency to the formation of new bone, and the newly formed fibrous tissue was scant, and was mostly transformed into cheesy material.

It might be stated that Habermann has previously made the observation that tubercular cases could be recognized by their great tendency to bone destruction.

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Description of Plates.

- Fig. 1, Case 1. Section through cochlea and nerve.
- Fig. 2. The same case. Perforation through stapes: (a) margin of window posteriorly normal, anteriorly carious; (b) stapes, posterior part of the plate with posterior branch; (c) annular ligament.
- Fig. 3. The same case. Semicircular canal. Bony canal is occluded with hyaline, vascular connective-tissue; the membranous canal in the upper and right-hand corner as a very small epithelial tube filled with hyaline material.
- Fig. 4, Case 3. A cellular part of the auditory nerve.

CONTRIBUTION TO THE PATHOLOGY AND TREATMENT OF DISEASES OF THE AC- CESSORY NASAL CAVITIES.

BY DR. F. ROEPKE, OF SOLINGEN.

Translated by DR. ARNOLD KNAPP, of New York.

1.—Three cases of caseated empyema of the accessory sinuses.

a.—Of the Ethmoid Cells.

In November, 1893, S. P., thirty-five years of age, consulted me on account of a fetid discharge from the right nostril, a dull pressure in the head, occasional vertigo, and spots before the eyes. His complaint interfered considerably with his work, and though he had formerly been a man of very passive disposition, he had recently become unusually irritable and had had a number of misunderstandings with his fellow-workmen. The right side of the nose, in its upper part, was filled with granulations and fetid pus. After the granulations had been removed a white cheesy mass occupied the middle meatus. The probe detected that the ethmoid cells bordering on the naso-frontal duct were filled with this mass. The cheesy masses were removed with a sharp curette. A cavity as large as a walnut was thereby exposed and carefully packed with iodoform gauze. The suppuration ceased after two weeks and the patient was free from all symptoms. A half year later he returned; the condition had remained healed.

Mrs. B., seventy-three years of age, consulted me in July, 1900, on account of severe headache and occlusion of the right nose. After having removed the polypi, which completely occluded the right half of the nose, the unusually dilated atrophic nasal cavity on that side was found to be filled with cheesy yellowish-white masses. The masses were curetted and were very

fetid. After irrigating the nose, the probe detected that a cavity existed in the anterior ethmoid cells. The walls of this cavity were covered with granulations. After their removal recovery quickly followed.

b.—Of the Maxillary Antrum.

W. J., thirty-six years of age, consulted me at the end of September, 1900. He had suffered from a discharge of pus from the right side of his nose for five years, together with a sense of pressure in the right cheek and occasional attacks of vertigo. During the past month the symptoms had become very much aggravated, the headache had become almost unbearable. The right half of the face had been swollen for a week, and there was a continuous discharge of fetid pus from the right nostril. The patient was an emaciated man, with a very unpleasant odor. The region of the right maxillary antrum was swollen and tender; over the right nasal bone there was a small fluctuating tumor; the right nasal cavity was filled with granulations and inspissated pus. After removing the granulations, the lateral wall of the nose was found to be carious. On account of the severe symptoms, the superior maxillary cavity was opened on the same day. A broad opening was made through the canine fossa. The anterior wall was found very thin, the entire cavity completely filled with cheesy, bad-smelling, yellowish-white masses, which were removed with the curette. The lateral wall of the nose is badly necrosed and covered with granulations. The other walls presented uniform thickened mucous membrane. The necrotic part of the lateral wall was removed with bone forceps and granulations carefully curetted. The abscess on the right nasal bone was opened and a small sequestrum evacuated. Microscopically, the cheesy contents of the maxillary cavity consisted of amorphous masses without any epithelial structures. Usually, after treatment granulations had to be removed from the middle meatus. Otherwise recovery took place without incident. After four weeks, the large cavity was dry, the small abscess wound was healed. The patient himself irrigates the cavity, and would not permit the opening in the canine fossa to close for fear of a recurrence. Six months ago I had occasion to examine the patient again. The opening in the upper jaw was large enough to admit your small finger; the cavity was entirely healthy, and there has been no further discharge from the nose.

The current literature on this subject has only recently been collected by Stida in these ARCHIVES. I simply would like to add that the caseation in all three cases was probably due to obstructed drainage. The experience of other authors, that these morbid foci quickly heal after removing the cheesy mass, is confirmed by my own case.

2.—A case of pneumatocele of the frontal sinus.

W. B., eighteen years of age, consulted me in 1898. He had suffered from headache, especially over the right eye, and from vertigo on bending forward, for a period of two years. The pain had become more severe for the past four months, and a distinct swelling appeared over the right eye. While a child, he had suffered greatly from coryza and pain in the ears, though he did not remember to have had any unusual amount of discharge from his nose. An injury of the frontal sinus had not occurred. Syphilis was denied. On examination, the anterior and lower wall of the right frontal sinus was distinctly distended and tender. The middle turbinal was cystic and dilated, occluding the middle meatus. The nasal cavities in every other respect were normal. There was no sign of suppuration. I suggested to the patient first removing the osseous cyst in the middle turbinal. After this had been done, the cavity in this turbinal was found absolutely empty. Various attempts to probe the naso-frontal duct failed. The frontal sinus was then operated upon. The anterior wall was as thin as paper. On breaking through the mucous membrane, air escaped with a whistling noise. The cavity appeared to be lined with perfectly normal mucous membrane; there was no pus. The anterior wall was then resected to permit a probing of the naso-frontal duct from above. This duct was found to be completely obstructed. A new opening was made with a sharp spoon, and a strip of gauze was passed from above into the nose. The external wound was sutured and a bandage applied. After three days the gauze was removed from the nose. The external wound had healed primarily. The patient's symptoms all disappeared. Six months after the operation the patient was free from all symptoms.

The occlusion of the naso-frontal duct in this case is responsible for the unusual distension of the frontal sinus.

The occlusion was probably the remnant of an inflammatory infection of the right half of the nose. The existence of an osseous cyst in the middle turbinal on the same side can also be interpreted in this sense, inasmuch as inflammatory irritations surely existed a number of years ago. A similar case has been reported only by Posthumus Meyjes.

3.—A case of fetid purulent frontal sinus empyema, with the production of crusts, in a pronounced case of atrophic rhinitis.

C. S., sixteen years of age, came on account of an odor and discharge from the nose, severe pain over both eyes, and occasional attacks of vertigo. A pale, scrofulous girl presented glandular swellings in the neck, a broad nose, and badly retarded development. The anterior and lower walls of both frontal sinuses were tender. The unusual dilated nasal cavities were filled with fetid crusts. After cleansing the nose, the middle and lower turbinals were found atrophied, and pus appeared in the region of the middle meatus. The probe could be introduced without any difficulty in both frontal sinuses. Daily irrigations of the nose and of the frontal sinuses, however, did not relieve the condition. In the beginning of July, both frontal sinuses were operated upon radically by a modified Kuhnt's method. The septum between both frontal sinuses was found perforated; the mucous membrane was partly detached from the walls and was covered with the same dirty, fetid crusts which existed in the nose. The nasal ducts were so broad that one could have introduced an ordinary lead-pencil. They also contained purulent crusts. After a careful removal of the mucous membrane from the frontal sinus, the cavity was again cleansed and packed with iodoform gauze. The external wound was sutured, except at one place where it was left open for the gauze. On the day following the operation the odor from the nose had disappeared. The packing was removed after three days and was not again inserted. There was a slight secretion from the nose; the formation of crusts on the atrophic nasal mucous membrane was not excessive. The external wound healed primarily. In the beginning of August the patient returned to work. After two weeks she experienced severe headache. The scar of the operation was red and bulging, with a distinct fluctuation. Both nasal cavities contained odorous pus and crusts. The scar was opened, and it was found that the flap consisting of the skin and

the periosteum had become elevated from the frontal sinus wall. The cavity thus produced was filled with pus and crusts. After daily irrigations, the suppuration ceased in two weeks. At the end of November, another obstinate relapse, with the same symptoms, occurred. After this attack had been cured, the patient determined to give up her factory work, and she has had no relapses.

It seems to me that this is a case of atrophic rhinitis occurring on a scrofulous basis. The excessive formation of scabs was facilitated by the dust in the factory. This had extended to the frontal sinuses through the unusually dilated nasal duct. In addition to the scrofulous disposition of the patient, the dust (metal and chalk) in the factory was also responsible for the re-infection.

4.—A case of frontal-sinus suppuration following a pistol wound ; extraction of the revolver bullet from the naso-frontal duct.

The patient, twenty-three years of age, had attempted in January of this year to commit suicide, and had discharged six shots from a revolver at his head. Immediately after the attempt, two bullets were removed from the left frontal sinus. The wound was at first healed, but later opened again and discharged pus. Beyond a moderate sense of pressure in the left half of the skull, he has been in good health. On the day of the attempt at suicide, a considerable amount of blood came from the left side of the nose, but there has never been any pus. I saw the patient first on March 4th. A fistula led directly over the eyebrow through the anterior wall of the left frontal sinus. Putrid pus exuded from the fistula. The nose was normal. The anterior wall of the frontal sinus was exposed. The walls of the fistulous tract were softened and covered with granulations. The frontal sinus was filled with granulations and purulent masses. The anterior wall was removed sufficiently to overlook the entire frontal sinus. The granulations were then curetted. No splinters of bone or bullet were to be seen. As the granulations seemed to be situated principally at the entrance of the naso-frontal duct, we attempted to pass a probe, and immediately encountered a foreign body which seemed to be wedged in the duct. With a strong pair of forceps we were enabled to remove this foreign

body, which proved to be a flattened revolver bullet. This was, of course, the cause for the frontal-sinus suppuration. Inasmuch as the naso-frontal duct was occluded, the pus could not find its way into the nose and had to pass through the original path of the bullet, through the anterior frontal-sinus wall. The patient is still under treatment.

REPORT OF THE TRANSACTIONS OF THE NEW
YORK OTOLOGICAL SOCIETY, MEETING
OF JANUARY 26, 1904.

BY DR. ARNOLD KNAPP, SECRETARY.

DR. J. L. ADAMS, ACTING PRESIDENT, IN THE CHAIR.

Dr. QUINLAN reported on **three patients living in the same house who suffered from suppurative otitis and complicating mastoiditis at the same time.** The complications in these three cases were of an unusual severity.

Dr. DUEL reported on a case of **paroxysmal cough** of nine years' duration. The patient, a boy fifteen years of age, had his tonsils and adenoids removed a year ago. A suppurative condition of one ear and a large cholesteatomatous mass were found at the same time. The mass was removed through the canal and the cough stopped for two months. He returned again in October and consented to have the ear radically operated upon. After the radical operation, in which Thiersch grafts were used, the cough seems to have been permanently arrested. The doctor explains the coincidence of the cough and the auricular lesion by pressure exerted upon the distribution of Arnold's nerve in the external auditory canal.

He also spoke of a lady of forty years of age, who had a very similar cough for twenty years, for which she had been treated everywhere. The entire respiratory tract had been carefully gone over by a number of competent authorities. The cough would come on in paroxysms, during which the patient nearly vomited.

After a careful examination of the nose and throat, everything was found normal. Remembering the preceding case, Dr. Duel examined the ears. On touching the distribution of this nerve

in one ear, no reflex was produced. On, however, probing this same area in the other ear, a typical paroxysm of coughing could be produced. He proposed to the patient to treat the area of distribution of this nerve radically by removing it, after resecting the part of the external auditory canal, and inserting a skin graft.

Dr. KENEFICK had seen the same patient and was very much impressed by the regularity with which the cough could be produced on irritating this particular area in the canal. He, however, doubted the efficiency of the operation, inasmuch as some cause in the chest could not be excluded.

Dr. ADAMS inquired whether a difference of temperature or some other peculiar feature had been noticed in the beginning of the paroxysms?

Dr. DUEL thought it was due to a disturbance in the circulation, as it always came on in the recumbent position.

Dr. ARNOLD KNAPP inquired what the area of distribution of Arnold's nerve was—especially what the sensitive area was—in this patient.

Dr. DUEL defined this area as occupying the junction of the posterior and superior wall of the auditory canal, where the membranous and bony canal meet.

Dr. MAY had seen a patient who would suffer from an attack simulating laryngismus stridulus, which would always be brought on by laughing.

Dr. BERENS thought that an irritation of the vagus from the stomach or the chest must be excluded before assigning the cause of the cough to be in the external auditory canal, inasmuch as no local change had been noticed in that locality.

Dr. COX reported on a **case of erysipelas** arising from the external auditory canal after a growth had been removed which made symptoms **very suggestive of mastoiditis**.

Dr. BERENS had had a similar case, though not occurring after an operation in the ear. There was a very large swelling behind the ear, with a history of discharge through the canal. On opening the mastoid he found it absolutely normal.

Dr. BRANDEGEE reported on a case where **symptoms of mastoiditis were caused by a furuncle in the canal**. There was considerable œdema and boggiess over the mastoid; the canal was stenosed. After making his incision, the cause of the swelling was found to be furuncle. He thought that in some cases it

was very difficult to make a correct diagnosis, and that it was better to operate when in doubt.

Dr. HALSTEAD had seen a patient who presented a great deal of swelling over the mastoid region. On opening the mastoid, it was found to be normal. The patient was a diabetic and subsequently developed a large swelling, carbuncular in character, in the neck, and died in coma shortly after.

Dr. HARRIS thought that it was not quite right to suggest an operation in cases of doubt; he thought that a delay of twenty-four hours very frequently solved the correct condition of affairs.

Dr. LEWIS reported a case of **hyperpyrexia in tympano-mastoiditis**. The patient, thirty-three years of age, had suffered from a severe coryza and an ethmoiditis for three weeks before he had seen her. During this time she had been much annoyed with tinnitus and deafness. There was no discharge from, nor pain in, the ears; no mastoid tenderness nor oedema. Two days before he had seen the patient, temperature began to rise, and at the time of his first visit it was 105.5° F. The only aural symptoms that were present at the time were a slight redness along the manubrium mallei, a very slight bulging of the posterior segment of the membrana tympani in the left ear and of the upper segment of the membrana tympani in the right ear, and a peculiar yellow hue of both membranæ tympani. A diagnosis of middle-ear infection was made because of the deafness, tinnitus and temperature, associated with the peculiar yellow appearance of both membranæ tympani. A paracentesis was made of each membrana tympani, and on an examination being made of a smear from each knife, a pure streptococcus infection was found to be present in each ear. The temperature fell to 103° F. by noon, followed by a rise to 105.5° F. by evening. Although there were no signs of mastoid involvement, it was thought best to open both mastoids because of the high temperature and the type of the infection.

The cortex of each mastoid process was hard, but the cellular structures beneath were partially softened, and filled with granulation tissue and some pus; more pus was found in the deeper cells than elsewhere. After the operation, the temperature fell to 101° F., but rose to 103° F. the second day, and the third day it ranged between 100° F. and 101° F. At present the right mastoid wound is healed and the left shows every indication of being healed in a very short time.

Dr. MCKERNON remembered having seen cases which were similar, where the only guiding mark seemed to be the temperature.

Dr. HARRIS spoke of a double suppurative otitis and pneumonia following upon an operation for the removal of adenoids in a child, in which ether anæsthesia had been given.

Dr. MCKERNON reported upon two children upon whom he had recently successfully operated for **primary sinus thrombosis of the jugular bulb**. The cases were similar, inasmuch as though the inflammation in the ear was well marked and the temperature was distinctly pyæmic there were no external mastoid symptoms, and upon operating the mastoid processes in both cases were found perfectly normal. Upon exposing the sinus in the first case, the sinus was found black. In the second case, it was impossible to tell which ear was the offending one. In one ear, however, there was a small granulation in the posterior inferior quadrant, so the sinus of that side was exposed and found to be yellowish-green. After incision a clot was removed, followed by straw-colored serum. In both these cases Dr. McKernon thought the infection started in the bulb, as most of the pathological changes were found in that part of the sinus, and in both cases the jugular bulb encroached unusually upon the middle-ear cavity. He thought that the infection had come directly from the tympanum.

Dr. LEWIS inquired why the jugular had not been ligated.

Dr. MCKERNON said he had been able to obtain free hemorrhage from below, and did not ligate the jugular vein unless the clot in the sinus was disintegrated or purulent.

REPORT OF THE TRANSACTIONS OF THE SECTION
ON OTOTOLOGY OF THE NEW YORK ACADEMY
OF MEDICINE.

MEETING OF DECEMBER 10, 1903. EDWARD B. DENCH, M.D., IN
THE CHAIR.

EXHIBITION OF NEW INSTRUMENTS.

Dr. KERRISON presented a set of bone forceps designed especially for use in the **radical operation** for chronic suppurative otitis media. In explaining their advantage over the older rongeurs, he said they could be introduced into a narrow canal, like the bony meatus, and would cut laterally or from within outward. In using these instruments, he found it easier to remove first the roof and posterior wall of the meatus and then the mastoid cortex covering the antrum. These instruments attack the bone from the tympanic end and cut from within outward. The doctor said this method of reaching the seat of the disease is safer, from the fact that the bone is cut in a direction away from the facial nerve, and also from the fact that after the preliminary steps of the operation the tympanic landmarks are thoroughly exposed to view. The instruments are made by Ford.

Dr. BERENS said that he had used the instrument and found it of much value in radical operations on the temporal bone, and that it materially lessened the danger of wounding the facial nerve, and made injury to the external semicircular canal impossible. Dr. Berens had found it very useful in operating on the accessory sinuses of the nose.

Dr. DUEL spoke of the great feeling of comfort experienced with the instruments in removing the bridge of bone in the radical operation. He said: "You are always working away from the facial nerve, and you can rapidly map out roughly the field

which we usually excavate in the radical operation." Dr. Duel also spoke of the instrument as being a great time-saver.

Dr. DENCH said that some years ago he devised a similar instrument for the removal of a portion of the upper bony meatus wall in ossicectomy, somewhat after the pattern of the old Hartmann instrument, which the instrument of Dr. Kerrison resembled. He said that he wished to sound a note of warning: that he had seen one case in which the instrument was used, in which a complete facial paralysis followed. He said that it was not absolutely safe; that in cutting well posteriorly with any instrument of this kind it is possible to injure the facial nerve. He considered, however, that the instrument was valuable and that it would shorten the time necessary in performing the radical operation.

Dr. KERRISON said that he could conceive of no possible anomaly in the course of the facial nerve which would render it liable to injury by these instruments; and that he could not see how an instrument of this kind could possibly injure the nerve unless it were jammed into the inner tympanic wall, which, of course, should be avoided.

Dr. RICHARDS exhibited a **set of curettes**, explaining that they differed but little from the ordinary curette used, except that the angle is bent back—the ordinary curette is bent forward. By using the ulnar portion of the hand as a fulcrum, and simple wrist movement, the curette, being held vertically, or nearly so, slides over the bone much more easily, and does not hang.

Dr. S. MACCUEN SMITH, of Philadelphia, read the paper of the evening, entitled "Middle-Ear Disease in its Relation to Metastatic Abscess of the Liver," which is printed in full on page 87 of this number.

Discussion.—Dr. MCKERNON stated that he had had no experience with cases of abscess of the liver resulting from suppurative disease of the middle ear, but that he had had several cases of metastatic abscess in other portions of the body, resulting from suppurative disease of the middle ear. He cited one case, that of a man of fifty-four, where metastatic abscess of the intestines took place, following an operation for acute mastoiditis following acute otitis. Five days later the lateral sinus was opened and a septic thrombus exposed. Six days later there was a large evacuation of pus from the intestines. Previous to this evacuation

there was a chill, then a sudden rise of temperature; a great amount of pain over the abdomen. The patient was much depressed. He was given, internally, the ordinary medication for movement of the bowels—calomel followed by a saline. Quite a large amount of pus was observed in the stools. The patient was immediately put on an internal medication of bichloride of mercury, $\frac{1}{10}$ grain every two hours, for ten doses. After that, the administration of the bichloride was made smaller— $\frac{1}{20}$ grain every four hours. The intestines were washed out, the flushing being done every four hours. The case made an uneventful recovery after three days of evacuations of pus from the intestines.

Two other cases which afterwards came under my observation were: a man of thirty-two and a girl of sixteen, both following sinus operations, where a septic clot was evacuated. The histories were practically the same as the before-mentioned case. They also recovered. The internal administration of the bichloride of mercury and high rectal washing were instituted.

Another case was that of metastatic abscess of the second finger of the left hand seven days after the evacuation of a septic clot from the sinus, and the ligation and resection of the internal jugular vein. Incision and packing cured the case.

Also, a case of metastatic abscess of the groin, following an affection of the middle ear, mastoid, and sinus. In that case, the accumulation of pus did not take place until fourteen days after operation. At first he did not know whether the patient had a phlebitis, or whether it was simply an accumulation of pus. On the second day hot fomentations were used; the temperature remained high, and the man had chills. The abscess was incised, and pus evacuated. The temperature went down to normal, and the patient recovered.

Another case, following a sinus involvement, where the abscess was in the axillary region on the right side. The usual course was pursued, the abscess was evacuated, and the temperature dropped. The patient recovered.

Another point which Dr. Smith spoke of in his last case was that an exposure of the jugular vein was made, and, as far as the eye could see, there seemed to be no involvement. It was, therefore, deemed best to leave it alone. This reminded Dr. McKernon of a case seen with Dr. Whiting. There was no apparent inflammation after exposure of the jugular vein, yet the walls of the vein contained large quantities of streptococci. Dr.

Dixon examined the pathological specimen, and reported that the whole coat of the vein itself was infiltrated with this material.

Dr. McKernon said, in conclusion, that if there was evidence to go by, and the trouble could not be located anywhere else, we were justified in the ligation and resection of the jugular vein. In his last case the condition was similar to that above-described. Though death took place afterwards, the whole lining membrane of the vein itself was infiltrated with this peculiar form of infection.

Dr. LEWIS said that he also had never had a case of metastatic abscess of the liver, but that he had a number of cases in which the abscess was located in some other portion of the body. He cited a case of double mastoiditis which he had seen a number of years ago in a young child, following measles. For a period of two weeks the child had a temperature varying from 99.5° to 105.5° F.; on two occasions it touched 106° F. Both mastoids had already been operated on by the doctor. The sinus was not exposed, although he thought it advisable to do so. The child was the daughter of a physician who opposed further operation. The child was seen in consultation with Dr. Whiting, who also thought that the sinus should be exposed, but Dr. Weir advised a few days' delay. Not even then would the father consent to further interference. During these two weeks a chill followed by high temperature occurred on an average of every sixteen hours. The child got well, and the only manifest metastatic condition was a phlebitis over the femoral vein on the left side. It did not go on to suppuration. Dr. Lewis reported another case in which a phlebitis developed in one of the tibial veins. That did not go on to suppuration either. The temperature was high and there were chills. This patient also got well.

He thought that the radical position which otologists take in cases of this character was an advisable one; that chronic suppurative ear trouble should not be allowed to run on indefinitely without operative interference. As an illustration of the serious nature of such cases, the doctor spoke of the case of a man, eighteen years of age, in good physical condition, whom he saw on the third day after his initial chill. The patient had had a scanty discharge from the ear for a number of years. On the third day after the chill he came to the hospital with mastoid and jugular tenderness. The mastoid was opened and granulations were found on the sinus. The sinus was exsected, but before an

opening was made into it an incision was first made in the neck and the jugular vein was exsected throughout its entire length. Then the sinus was opened and a large septic clot removed. Notwithstanding the fact that this operation had been done at so early a date as the third day, the man got up a double septic pneumonia on the fifth day and died on the thirteenth day following the operation. The clot in the jugular vein was not infected, but the vessel walls were.

Dr. BERENS thanked Dr. Smith for calling attention to the evils likely to arise from chronic or acute suppuration of the middle ear. He mentioned the fact that Dr. Burnett had reported a case of abscess of the liver from chronic suppuration, this being quoted in Dr. Luc's recent book. He stated that it is claimed by some that the general circulation is affected direct through suppuration in the middle ear, and that these infections of the general circulation are infections through the walls of the veins, that the cocci are taken up and deposited in various locations—whether it be in the liver or in and about the joints, especially about the tendons, makes no difference,—and compared the condition to gonorrhœal rheumatism. Dr. Berens said that he had not seen a case of abscess of the liver from middle-ear suppuration; that he had seen these inflammations about the joints, inflammation of the muscles, of the intracellular muscular tissue, with and without pus formation, get well *with* incision and without it. He said that he believed cases of parietal clot formation would cause the same condition; that it was a well-known fact that cases of lateral-sinus thrombosis produce metastatic abscess of the lungs, but he doubted metastases to the liver being possible in the same manner. The doctor said that it was argued that these were cases of the direct breakage of the clot, and a deposit of it in the pulmonary circulation, while direct absorption of cocci by the blood without clot formation would permit of septic infection in any part of the body. He said that Dr. McKernon's second case would seem to confirm that view, in that the walls of the sinus were infiltrated with the various cocci; and that it was only reasonable to suppose that if the walls are infected the circulation will rapidly take up the infection. He thought the lungs would filter out any clot, hold it fast, and thus prevent its passage to the liver or elsewhere.

General Discussion.—Dr. LEDERMAN spoke of a case of chronic suppurative otitis which had come under his observation, in

which there was a marked destruction of the mastoid, also sinus and jugular thrombosis. The jugular was resected and the patient seemed to get along fairly well for about a week, although at time of operation subcutaneous infusions had to be administered. About the sixth day the temperature suddenly rose to 104 $\frac{1}{2}$ ° F., and the man complained of pain in the abdomen over the right side. The patient was transferred to another hospital. There was some doubt at the time whether or not an appendicitis was going on. Dr. Elliot found what he thought to be an acute inflammatory cyst of the liver. At first glance it appeared to be very similar to an echinococcus cyst. No bacteria was discovered to account for the infection, although it contained quite some fluid, which was rather clear. The patient recovered. Cultures proved negative.

Dr. Dixon said that he had examined a large number of clots in cases of thromboses of lateral sinus and internal jugular, and that it was very rare indeed to find any micro-organisms in the clot itself—they are almost invariably in the walls of the veins. He said that he had had no experience in metastatic abscess of the liver.

Dr. SMITH, in closing the discussion, said, in answer to Dr. Lewis's question as to the location of the pain, etc.: The pain in the neck and shoulder was always on the right side.

In answering Dr. McKernon with reference to the passage of pus and the very frequent movement of the bowels, he said: "I am not sure that such a condition existed; it was not mentioned in the records, so I presume it did not occur. As regards the ear which is involved, I do not know that the **right** ear was always involved. I do know, however, that in two cases both ears were suppurating.

Dr. Berens speaks of the infection of other organs. I believe it is generally accepted that metastatic abscess resulting from the ear, if not very common, certainly does occur rather frequently, and the point in connection with the liver is—that the infection in order to reach the liver must go in a reverse direction of the current of the blood. Hartmann injected small particles of wheat into the sinus and veins. Those particles were too large to go through the capillaries and yet they were found in the body. It does seem curious, but that fact has been pretty well established.

Inflammation of the liver is no doubt more or less common

as a secondary inflammation, but as the primary inflammation from the suppuration of the ear it certainly does seem rare.

In the second case the jugular vein was seen at the post-mortem examination. There was no reason to suppose that there was any trouble with the jugular whatever during life, although pain in the neck was severe. Evidently it was not involved, so far as we could tell.

MEETING OF JANUARY 14, 1904. DR. HERMAN KNAPP IN THE CHAIR.

Dr. KERRISON, in speaking of the bone forceps which he had exhibited at the previous meeting, said that at that time he had presumed this instrument to be the only one of its kind in existence, but that his attention had recently been called to two instruments made in Germany, which were of somewhat similar construction, but which presented differences rendering them unavailable for the heavier work for which his forceps were designed.

PRESENTATION OF CASES.

Dr. SMITH presented for J. D. Richards a **case of squamous-celled epithelioma of the auricle**, saying that the trouble had existed for something over a year, but that it had materially increased in size during the last four weeks. A section had been removed and examined, showing squamous-celled epithelioma. The X-ray had been applied eight times, the time of each application varying from five to ten minutes. The tumor had increased daily in size, and there seemed to be some metastasis of the neighboring gland. Dr. Smith said that the physicians who had examined the patient had been able to determine a small gland between the ramus of the jaw and the tip of the mastoid process, which had occurred in the last two weeks. The X-ray seems to have had no beneficial effect. He expressed the hope that it would come out in the meeting whether it would be best to continue the X-ray, or submit the patient to radium tests. The man was apparently in good physical condition, and the complete removal of the growth could be satisfactorily accomplished by surgical methods.

Dr. HARRIS cited a case which had recently been reported at the New York Otological Society by Dr. Wilson of Bridgeport—an epithelioma of the auricle, or, if not that, of the auditory

canal. Dr. Wilson had considered the case cured by X-ray, but shortly after the discontinuance of the X-ray treatment the growth returned. Recently, it has been treated with radium, with surprising results, the patient having had a large number of treatments given within short intervals of time. This result was regarded as much more brilliant than that achieved by the X-ray. There is no sign of the growth at the present time.

Dr. TOEPLITZ read a paper entitled "Neglected Education of the Partially-Deaf Children."

The education of children with impaired hearing is neglected, as this misfortune is usually not noted. Hardness of hearing means not only a decrease in the hearing faculty but, in the growing child, a retarding influence on all the functions intimately connected with the acoustic sense, such as feeling, emotion, and, most of all, speech. The defects in hearing after aural lesions were then described.

The impeded psychic development should be overcome. Pedagogic treatment should begin early. The various means by which this is accomplished are mentioned. The further education of these children should aim to develop the mind as much as possible, and for this a close co-operation of the physician and educator is essential.

Dr. MAXIMILIAN P. E. GROSZMANN also read a paper, which was entitled "Difficulties and Methods in Teaching Children who are Hard of Hearing." (Author's abstract.)

In the handling of the hard-of-hearing child, two elements must be considered, the *hygienic* and *educational* elements.

Let me first speak of the hygienic features, including local treatment.

Hardness of hearing has many different causes, some of which are removable. First, then, remove the causes, if you can, be they adenoids, hypertrophied tonsils or nasal tissues, catarrhal conditions, or what not. Such treatment, which is, of course, the physician's, will relieve some cases permanently.

But if we are dealing with chronic cases, a certain hygienic regimen becomes necessary. Nose and throat must be kept scrupulously clean, eventually by aseptic washes and gargles, and care must be taken that only pure, cold air be breathed freely day and night. Much exercise in the open air is very desirable. Mouth and teeth must be kept in as perfect condition as possible so as to avoid bacterial complications. Avoid colds and

inflammations, not so much by keeping the children warm as by insuring them to fresh air and cold baths. General cleanliness and a rational hardening process are important factors. There must be a general tonic regimen, improving the vitality of the system, and healthy reaction of all organs.

The matter of diet deserves much attention. Simple and natural as the life of these patients should be, as simple be their diet. Non-irritant food, easily digestible, albuminous substances in preference; good milk; no dish either too hot or too cold; avoidance of stimulants like coffee, tea, and liquors, such as would cause congestions—these are the main requirements, and well enough known to all of you. All this is a matter of rational home regimen.

They form the necessary basis for the educational efforts we may make for the alleviation of the pathological condition. Even in the *training* of the hard-of-hearing child, *physical* training, gymnastic exercises, stand in the foreground; again in the first place, on account of their effect upon the tonicity of the body, on the digestive functions, the circulation, the joyfulness of spirit. The play instinct must be made use of, and games and sports will contribute much to developing the child's condition. In these latter, we have principally large movements, bringing the larger muscle-groups into activity, and inciting to exhilarating exercise and to wholesome growth. The games also mediate, in play-form, a knowledge of the occupations and the elements of civilization, like hunting, riding, etc., and give experience in skill and concerted action. It would be wrong to subordinate this free play too much to formal exercise, as the body as a whole is first in need of stimulation. Sports and games also encourage a life in the open air.

But the value of formal gymnastics must not be underrated, especially of rhythmical and co-ordinated exercises. The influence of the normal condition of the hearing faculty upon movement, rhythmical movement, is marked, and any impairment of the aural faculty leaves its effect upon the motor activity. The hard-of-hearing child is uncertain, inco-ordinate, and unrhythmical in its movements, more so, it appears to me, than the child with defective vision, at least in a number of cases. Consequently, exercises that will train the child in rhythmical and co-ordinated movements, like free exercises, drill with dumb-bells and Indian clubs, swinging from rings, etc., will supply a want

in its general physical and psychical make-up. These exercises may at the beginning have to be of a passive character, until the child gets the rhythm into its motor-consciousness. We must not forget that the hard-of-hearing child is deprived, to quite an extent, of the stimulus and help *music* affords, and that this circumstance puts it at a great disadvantage in all its movements and incentives for movements. A whole chapter could be written about the importance the musical stimulus has for the healthy development of the normal child. In the hard-of-hearing child whom these stimuli rarely or imperfectly affect, entire areas of the brain may remain rudimentary. Permit me to refer only to the effect upon its *emotional* condition. The rhythmical feeling is closely connected with our emotions—with our sense of beauty, of grace, of harmony. The mere beating of a drum inspires not only savage tribes but civilized man to rhythmical sensations which set free emotions of courage, of patriotism, of joy, of pleasure, or of sadness and grief. In the soul of the hard-of-hearing child, there are vacua, or, at best, but scattered fragments of these perceptions and emotions; and it lacks, to a marked extent, harmony, grace, temper. It is apt to be morose, suspicious, irritable, changing to excessive, painful hilarity, without measure or control. The more, therefore, we can introduce the element of rhythm into the education of the hard-of-hearing child, the better for its psychical development.

Special exercises may have their value. I have in mind particularly those that will develop respiration. Lung and throat gymnastics are of great importance; they will enhance the faculty of speech, which is much impaired by the lack of hearing. Exercises on the convex ladder, with wands, general breathing exercises, blowing up of cheeks, etc., should be followed by well-graded exercises in articulation.

Gymnastic exercises also stimulate and train the power of *attention*, and of co-ordinate movement. How necessary a strengthening of the attentive faculty is for the hard-of-hearing child will be shown later. As to co-ordinated activity, gymnastic exercises find their natural complement in *manual training*, which may include gardening, carpentering, wood- and iron-work of different kinds, basket-making, weaving, sewing, modeling, painting, drawing, cardboard geometry, and a variety of occupations. Here, again, one must begin with the larger movements, and introduce the finer co-ordinations, with smaller work, gradually. The ele-

ments of civilization, which are *symbolized* in the games, assume a more *real* aspect in manual training; and this circumstance is very important, as the hard-of-hearing child is deprived of the opportunity of gathering that vast amount of information which the hearing child absorbs from the conversation with, and of, others. Any one who has had any dealings with hard-of-hearing children will be struck with their peculiar lack of general information. They are apt to confuse the simplest things and relations, because they lack the chance of correcting and organizing their impressions by speech intercourse. They remain, to a large extent, shut up within themselves.

It is for this reason, also, that their instruction will have to be largely objective and creative in method. The senses of sight, of touch, and the muscular sense must be developed to aid them in their intellectual growth. Pictures, toys, indoor games, will play a great part in their training. The other senses will have to do at least a part of the work which otherwise would be the function of the aural sense. But there is a deeper reason for so doing.

Senses mutually stimulate one another. There seems to be a special relation between the sense of hearing and that of the perception of color. Cases have been reported of color-hearing—that is to say, each sound heard, by certain persons at least, produces in them a distinct sensation of color. There is a case recently mentioned in the *British Medical Journal* of a neuropathic man of impaired mentality who had all consonants and vowels associated with color sensations. The cry of a dog was yellow, of a blackbird red, of a raven greenish, of a cow indigo, and of a goat light yellow. Sensations of form were associated with color and auditory sensations—thus, a circle always appeared red, and had the sound of the vowel *o*. Smells also had associated colors—thus, that of iodoform had a deep red color, also a sour, bitter taste. Impressions of taste had colors—thus, sweet was carmine, salt an agreeable yellow; and impressions of color had accompaniments of taste and temperature—cold was green, and heat was red.

Now, while a neuropathic condition may predispose a subject to morbid associations, it is, nevertheless, true that many normal persons have similar “inductive perceptions,” as we may call them. And since hard-of-hearing children belong to a class where normal conditions are suspended or modified, further in-

vestigations may reveal how a stimulation of other senses will react upon the aural sense and there produce sensations which may, in a measure at least, re-institute normal function.

At any rate, complete perception requires the rounding out of a concept by the co-operation of several senses. For instance, the concept of a bell is composed of the perception of its sound, shape, hardness, etc. It is evident, then, that if one sense perception is eliminated from this composition, the complex concept is imperfect. The hard-of-hearing child may never have a full understanding of what a bell is ; but if we succeed in making the other composing elements of the concept particularly strong, it may, by inference, arrive at a fair notion.

This inference plays a part in another relation, that of speech to hearing. The hard-of-hearing child will always have difficulties in speaking correctly. But this difficulty can be minimized by painstaking training of the organs of speech, through practical phonetics. When the muscular associations and activities which make speech will have come under the ready control of the hard-of-hearing child ; when the association tracts in the brain centre of speech will run smoothly, there will also be a beneficial effect upon hearing. That is to say, even an indistinct sound-stimulus, of the spoken word, will set free in the brain centre those associations which correspond to the motor-memory-image of that word, and, through automatic imitation, the spoken word will be perceived more readily and clearly ; just as a person of normal hearing will understand even indistinct speech, or as we can read a written page of familiar words even under insufficient illumination, not being able to see every letter or word, but composing the whole from the fragmentary visual stimuli we receive.

As Professor Donaldson shows (*Growth of the Brain*, p. 349): "Clinical studies furnish grounds for the idea that the presentation of an object to any one of the senses revives the mental image of that object in terms of the other senses which may be, and formerly have been, excited by it, and that the more vivid these associated images, the more concrete and clear is the conception." Since many hard-of-hearing children have acquired their impairment of function after birth, and as all have hearing in at least a rudimentary form, the application of this statement is evident. It furnishes the only explanation why Helen Keller, who now perceives only through her tactile and muscular

senses, can think in terms of the other senses, which, in her case, appear atrophied.

If we agree with Dr. Joseph Collins, who asserts the "monitorship of auditory over other images" (*The Faculty of Speech*, p. 51), and I think he is more than right, if we remember how sorely handicapped hard-of-hearing children are through their lack of speech-communication and speech-expression, how their information is fragmentary and their abstract thinking often ill-organized (Max Müller has said: "Language is identical with rational thought"), if we remember how many of these children remain on the low plane of "objective thinking"—we must welcome every opportunity of improving the hearing faculty by educational means, after the physician has stepped aside. Mechanical means are even at the present day poorly developed. The ordinary ear-tube has its dangers, being a source of mechanical or infectious injury.

The fact, by the way, that hard-of-hearing persons can hear better over the telephone, has led to experiments with an apparatus which is constructed on the same principle.

But neither this nor the device of lip-reading improves the hearing, or has any educational value.

In considering means in this direction, we must of course recognize the different classes of hard-of-hearing children: the *near*-hearing children, and the *weak*-hearing ones, and those in whose sound-perception there are modifications of values, comparable perhaps to color-blindness in the province of vision.

But the secret of success in every case will be in the training of the child's *effort* and *attention*. Concentrate attention upon aural impressions, so that these, faint in the beginning, may increase in force. It is astonishing what results can be obtained in strengthening the hearing faculty by judicious and systematic exercise, if the necessary opportunity, time, and patience be granted. For such work is very slow, and requires years, sometimes many years. I have reports from several successful teachers of hard-of-hearing children, notably Mrs. Reno Margulies, which show how children, considered to be even deaf, were able to learn how to hear. Daily tests with bells, tuning-forks, whistles, musical sounds, words spoken at different pitch, etc., lead up to more complicated exercises, always following the sequence of sounds as conditioned by their respective auditory

values. The best results are accomplished if the children can be taken very young.

It is evident that all this is very special work, to be done only by specially trained teachers. It is not the work of the schools for the deaf-and-dumb; these have their own special field. But there ought to be day-classes and day-schools; and for the many who need a well-regulated educational and hygienic environment, special institutions, where these children can be educated. There are many thousands of them, of different degrees of impairment. Few of them as yet receive the proper training—most are dragging along an awkward existence in ordinary schools where they cannot thrive, but are having their minds and faculties warped. This is only one part of the great problem of the "*atypical child*," which it has been my privilege to broach—that is, of the child which is not abnormal enough to be classed with the blind, or the deaf, or the idiots, or the feeble-minded; which is not necessarily dull at all, but may be even brighter in intellectual force than the "average" child; but which is handicapped by impairments of the nervous system, of the sense-organs, of the bodily functions, etc., in such a measure that it needs special attention and special training, and often a special environment. A beginning has been made to tackle the problem of the atypical child; may the work grow so that it may bring its blessings to the thousands who need it.

Dr. JARECKY said that, in thinking over the papers read by Dr. Toeplitz and Dr. Groszmann, it seemed to him that the principal point to be brought out was the absolute necessity of starting the educational work as early as possible—much earlier than the kindergarten age. A child that loses its hearing should be taught to repeat words and sentences. Words should be spoken over and over again, so that the child may retain whatever faculties it may possess at the time. The method of turning away and having the child sit with the ear towards the speaker, whose lips are covered, is somewhat successful. But whether these children hear better later on than they did before, he doubted very much; he considered that all that was gained was what Dr. Groszmann had brought out in his paper: concentration in the individual from beginning to end; that the principal thing was the individual training of these children.

Dr. PHILLIPS commended the two papers read, and spoke of an instance which occurred two or three years ago, when, in

talking with a blind woman she remarked that it had always been a cause for great thankfulness that she was blind rather than deaf. She gave as her reasons, that while blindness shuts out colors and views and the faces of friends, deafness shuts out far more. These statements had led him to think much more seriously of the effects of deafness. He emphasized the great importance of commencing the teaching of deaf children in very early life, provided the physical training should keep pace. As regards the hygienic training, Dr. Phillips said that the greatest care should be taken with reference to the physical development of every child, whether deaf or not. He did not believe that people could possibly comprehend what it means for a child to start out in the struggle for an education—and even for the very necessities of life—without the foundation of strong, vigorous health. Children should not be coddled, but trained so that they will be able to withstand the changes of temperature and the necessary exposure incident to the climate in which they live. The development of the other faculties as an aid to hearing had never been so fully impressed upon him before, and he believed there was a great deal to be accomplished along these lines. He also remarked: "There can be no time better spent by the man who is giving his time in ear clinics, than to stop for a moment or two and instruct mothers and fathers as to the necessity for commencing, under the best circumstances possible, the education of their deaf children at a very early age." He considered it useless to send a child with defective hearing to public school, but those who attended should be given front seats. He spoke of the great necessity for more and larger institutions for the education of the deaf. He said he believed that the time was coming when more would be done by the city governments for the education of these children—since so many of them become public wards when with education they might be self-supporting.

Dr. MEIERHOF said that he had had some personal experience in the matter; that the subject of teaching the deaf and the partially deaf had already received a great deal of attention in Europe. He said that in the education of the deaf the methods of Urbanschitsch have been followed more or less. He spoke of the importance of the management of the *partially* deaf, saying that as yet no provision had been made for the teaching of these, that the term "partially deaf" was a very elastic one, covering

many grades of deafness. He spoke of a class of children who make no progress in ordinary schools even though they have a fair amount of hearing—hearing for loud conversation. The doctor mentioned that there are quite a number of these children who to-day are in deaf-mute institutions although they do not belong there; that it was injurious to them, inasmuch as they had no opportunity to exercise the remaining function. He said that he believed some provision should be made by the State or the city for the teaching of such children whose parents cannot afford to pay for them. These partially deaf children degenerate and become a class belonging to the deaf-mutes, and it is certainly unfair that this state of affairs should continue to exist. Dr. Meierhof spoke of another feature—the mentality of the partially deaf. The so-called otosclerosis or hardening process that goes on in the labyrinth and the inner tympanic structures is seen in a certain class of older children in which the mental development may also be retarded. There should be some provision made for the partially deaf, and whether this body should initiate a movement whereby the city should provide means for the education of this class, was left for the consideration of the Section.

Dr. H. KNAPP spoke of psychical deafness, a defect analogical to psychical blindness, saying that both were mostly acquired, but may be congenital. He referred to children that cannot learn to read. Although they may be very intelligent in other studies, mathematics, for instance, they have the greatest difficulty to learn the alphabet. The cause was nothing but the insufficient development, or, in adults, the deterioration of the memory centre of sight, which occupies a definite area in the brain, being, you know, quite near the conceptive centre of hearing, which is situated in the posterior part of the two upper convolutions of the temporo-sphenoidal lobe. He said that these parts were the storehouse of the memory pictures as developed by experience and study. When they are degraded or destroyed, the psychical interpretation of the visual or auditory perception is weakened or impossible. For instance, a man loses his own language and keeps French, Latin, Greek, etc., which he did not know so well. Then, only one particular place of his memory centre is obliterated. A number of such cases among musicians, composers, etc., are on record, it being thought that Beethoven was one of them in his old age. Dr. Knapp spoke of a musician and composer

whose case had, over a year ago, been reported by Dr. F. Alt, of Vienna. This man, after a disease, could not appreciate music when played; all was an intolerable discordant noise; but when he looked over a score he was delighted; he had the same impression and sensation as if he heard it played by a perfect orchestra. There is a problem before us: to find out whether a person is deaf from morbid conditions of the receptive, conductive, and perceptive parts of the auditory organ, or of its conceptive part. Let us call the former—by far the greater number—the mechanically deaf, the latter the psychically deaf; or, shorter, the ear-deaf and the soul-deaf. When we analyze the case of a deaf child with regard to its education, we must separate these two kinds of deafness. In the ear-deaf we must examine all the parts concerned in the mechanism of hearing: auricle, ear canal, drumhead, drum and its contents, labyrinth, the nervous conduction to the centre of perception, *i. e.*, the auditive cortical field in the temporal lobe. In the soul-deaf we must examine the psychology of hearing, the memory or conceptive centre, and its connecting fibres with the motor centre of speech, and the aural connections between the right and left hemispheres. In this last part there is a larger field yet to cultivate, which is chiefly the business of the physician, especially the pathologist. Examine soul-deafness, which, like soul-blindness, may be congenital or acquired, and let the pathologist carefully dissect the brain, in particular the region below the end of the Sylvian fissure. The shortcomings in the mechanical part of hearing are tolerably well studied. In this group of cases the educator must take the aurist as a coadjutor, in the other the psychologist, according to the principle that his psychically hard-of-hearing pupil must supply his defects of audition by the other senses, which Prof. Groszmann has also pointed out. In this way the educator may bring up a human being mentally, as far evolved as his contemporaries, and acceptable to the society of civilized people.

Dr. TOEPLITZ said that, although he did not prove by figures his claim that many of the children in the public schools are hard of hearing, he was positive that this was the case. He instanced the examinations made in Germany, where quite a large percentage of pupils were found to be partially deaf. He remarked that Dr. McKernon, in examining a school in Yonkers recently, had found, among 150 pupils, 38 with hardness of hearing and 20 with bilateral deafness—that is, 33% unilateral and 13%

bilateral. He thought that if the schools in New York City were examined, a similar number with defective hearing would be found. He suggested that the authorities should not appoint at random, for the examination of children, men who have no proper idea regarding the examination of the eye, the ear, etc.; that only men with the requisite knowledge and intelligence should fill such places; that these children with defective hearing should at least be placed in separate classes.

Dr. GROSZMANN, in closing the discussion, said that he had little to add; that he had been very much interested in the discussion which had followed Dr. Toeplitz's paper and his own, and that he felt much indebted to Dr. Herman Knapp for bringing out the psychic side of the subject. As regarded color-hearing, the doctor said that he personally knew very little about it, except that he had had an opportunity of experience with quite a number of persons with whom color-hearing seemed to be a fact. He spoke of several schools in this city that pay special attention to children partially deaf, and thought that this work should not be left to private enterprise entirely, but that the city should take up the subject and care for this particular class of children, as regards their education. The doctor spoke of having examined children in the public schools; he said that the number suffering from adenoids and other obstructions was simply amazing. He told of a California investigator who claimed that the percentage of children who are handicapped — visual, aural, etc. — is as high as 25, leaving only 75 % of children who should be in the ordinary schools. The doctor thought this might be slightly exaggerated, but expressed his belief that there were thousands of children for whom special provision should be made—children whose circumstances would prevent their being sent to private institutions. He suggested, too, that the medical supervision and examination in the public schools should be better organized than it is at present; that a systematic examination of the children has not yet been instituted; that there should be specialists for this purpose, as brought out by Dr. Toeplitz.

REPORT ON THE PROGRESS IN OTOLOGY DURING THE SECOND QUARTER OF THE YEAR 1903.

BY DR. ARTHUR HARTMANN.

Translated by Dr. ARNOLD KNAPP.

ANATOMY AND PHYSIOLOGY.

125. **Alexander, G.** Post-embryonal growth of the human ear labyrinth. *Anatom. Hefte von Bonnet und Merkel*, Heft lxiii. (vol. xix., No. 3).
126. **Rabinowitch, A.** The development of the membranous labyrinth in the Emys Europæa. *Inaug. Dissert.*, Berlin, 1903.
127. **Rawitz, Bernhard.** The semicircular canals of the turning doves. *Arch. f. Anat. u. Phys.*, 1903, Nos. 1-2.
128. **Hanson, E.** A case of the internal carotid passing through the tympanum. *Münch. med. Wochenschr.*, 1903, No. 22.
129. **Levi and Rothschild.** Congenital facial paralysis with mal-development of the ear. *Arch. internat. d'otol.*, etc., 1903, p. 373.
130. **Panse.** A simple method to prepare the temporal bone for microscopic examination. *A. f. O.*, vol. lviii., p. 129.
131. **Ferreri.** Hearing after operative intervention on the sound-conducting apparatus. *Arch. ital. di otologia*, vol. xiv., No. 2.
132. **Wassiljew.** The fatigue of the auditory nerves. *Wojenno Medicinski Shurnal*, March, 1903.

125. The author has made enlarged corrosion specimens of the inner ear of the new-born and adults. After-measurements agree with those of Siebenmann, whose careful paper the author has apparently overlooked. The measurements of the aqueducts of the internal auditory meatus and of the nervous canals are new, as well as the relations of the position of the various parts of the labyrinth to one another. DENKER.

126. A series of embryos of land turtles were examined in serial sections, and six of these were reconstructed according to

Born's method. This is the first monograph on the embryology of the ear labyrinth of the land turtle. BRÜHL.

127. RAWITZ observed two turning doves which performed somersaults when they were sitting on the ground and were forced to get up. The anatomical examination consisted of serials of a macerated and a hardened skull. On both sides, perfectly normal semicircular canals were found present. A section of the horizontal canal is said to cause the somersault movements. The author concludes that the canals have nothing to do with the function of equilibrium, inasmuch as these turning doves, notwithstanding these disturbances in equilibrium, possess normal semicircular canals. These positive findings of anomalies of the semicircular canals in dancing mice do not contradict the normal condition found in the turning doves, as the latter possess disturbances of equilibrium, while the dancing mice show a disturbance in orientation. BRÜHL.

128. The artery rose from the floor of the tympanum, covering the round window up to the upper margin of the oval window, then described a curve on the promontory anteriorly and inwardly, passing underneath the musculo-tubal canal, and finally entering the bony carotid canal in its horizontal part. The space between the promontory and the membrana tympani was completely filled by the carotid; the drum appeared somewhat bulging. SCHEIBE.

129. A delicate child, three months of age, presenting an undeveloped left auricle, which is forced forward, together with the cartilaginous auditory meatus, and attached to the cheek. Peripheric facial paralysis has existed since birth. A disturbance in development probably is also present in the middle ear. The mastoid processes on both sides are equally developed. The left half of the lower jaw is slightly atrophied. The ascending ramus of the lower jaw does not run in the same direction as the right, but more posteriorly and externally. The left parieto-occipital suture is not ossified. OPPIKOFEK.

130. PANSE saws in five different planes, and the resulting dice-shaped pieces of bone contain all the important parts, even the ossicles, in their natural position. HAENEL.

131. After a critical study of the theories of Scarpa, Secchi, and Nuvoli on the physiology of the middle ear, the author describes his experiments, and concludes as follows:

(1) The favorable clinical results following intratympanic surgery can only be explained by the Helmholtz theory.

(2) The mobilization of the stapes is not without use.

(3) Secchi's theory, that the round window is the only way for the sound to be transmitted to the labyrinth, has not been proved.

RIMINI.

132. The examinations were practised with various tuning-forks on soldiers with healthy ears. In each soldier the air- and bone-conduction were examined. Irritation of the auditory nerve, with all the tones, was followed by exhaustion in air- and bone-conduction more quickly than the irritation with deep forks. In bone-conduction the fatigue appeared more quickly than in air-conduction. These results led the author to conclude that the sound-waves in bone-conduction act directly upon Corti's organ without passing through the tympanic cavity. If the sound-waves in bone-conduction would at first pass through the tympanic cavity, they would be diminished in their action; and this would not explain the more rapid fatigue of the nerve cells in bone-conduction.

SACHER.

GENERAL.

a.—REPORTS AND GENERAL COMMUNICATIONS.

134. **Grunert and Schulze.** Annual report of the university ear clinic in Halle, from April 1, 1902, to March 31, 1903. *A. f. O.*, vol. lvii., p. 231.

135. **König.** The examination of the ears in a village school. *Bresgen-Heermann'schen Sammlung zwangloser Abhandlungen*; Halle, Marhold, 1903.

136. **Laubi.** Methods and results of an aural examination of 22,894 pupils in the public schools of Zurich. *Correspondenzblatt f. Schweizer Aerzte*, xxxiii., No. 13.

137. **Bezold.** Demonstration of four operative cases: two tumors, a plaster cast in the auditory meatus and a cholesteatoma with gravitation of pus to the scapula and clavicle. Vortrag im ärztl. Ver. München. *Münchener med. Wochenschr.*, 1903, No. 22.

138. **Felix.** The unconsciously deaf. *La semaine médicale*, 1903, p. 101.

134. The following are the important case histories and autopsy reports during the year:

(1) Interlamellar abscess of the drum membrane.

(2) Chronic purulent otitis with pyæmia. Radical operation after slight remitting fever for ten days; chill; temperature 39°. The distended tip of the mastoid process was removed. High

fever, without a chill, with unusually rapid pulse. Operation on the sinus after ligation of the jugular vein. Gradual fall of temperature, which, however, continued for four weeks after the sinus operation.

This case illustrates the opinion held in the clinic in Halle—not to operate on every case of sinus thrombosis, but wait after the removal of the primary focus in the mastoid process when the general condition is good and only moderate fever is present. This is supposed to mean a but mildly virulent thrombus. If then the fever rises, chills or other signs of severe systemic infection of the body appear, then the sinus is to be directly attacked.

(3) A case with doubtfully diagnosed ear pyæmia following a bilateral acute otitis media, or a severe pyæmic form of the protracted form of scarlatina without exanthem was present. Recovery without operation except the surgical treatment of the metastases.

(4) Chronic purulent otitis with cholesteatoma. After the radical operation, at first normal course; seven weeks later a fistula was discovered in the horizontal canal, which discharged pulsating pus. Labyrinth operation: the vestibulum was chiselled open from the posterior branch of the horizontal semicircular canal, as well as the cochlea from the promontory. After removal of the oval window, a small bridge of bone of the exposed facial canal alone remained. During the after-treatment, which lasted five months, a sequestrum consisting of the cochlea was cast off. The at first total facial paralysis later decreased. Unusual in this case is the complete absence of vertigo, which is, however, explained by the findings at operation. Suppuration of the labyrinth: the functional examination before the labyrinth operation showed no hearing for whisper and high tones near the diseased ear; C was transferred from the vertex to the other ear.

(5) Bilateral cholesteatoma. On the right side an operation had been performed by a surgeon four years ago. There now exist an atresia of the meatus, total facial paralysis, deafness, and vertigo, which are said to have existed for many weeks. The labyrinth was unquestionably injured. After radical operation, with an extensive exposure of the facial nerve, the suppuration was healed and the facial paralysis disappeared.

(6) A chronic middle-ear suppuration, with suspicion of intra-

cranial complication. Lumbar puncture was negative, so purulent meningitis could be excluded, and tuberculous meningitis was made probable. At the radical operation the dura of the middle cranial fossa was found diseased and an abscess in the temporal lobe was suspected. An incision was made into the temporal lobe, but no abscess found. The varying character of the disease in its future course corroborated the suspicion of the tuberculous meningitis. The case remained unexplained; by the wish of the parents the patient was allowed to go home.

Of the fatal cases, the following are remarkable: (1) Abscess of the temporal lobe after acute otitis media. Notwithstanding operative evacuation of the abscess, progressive softening in the neighborhood of the abscess to near the ventricle. Sympathetic exudate into the ventricle, then cerebral hernia, a rupture of the ventricular exudate into the abscess cavity on the eleventh day after the operation. Infection of the ventricle and development of meningitis, which terminated fatally after eight days. The authors think that the intracranial complication developed as a result of retention of pus, which was aided by irrational insufflation of boric acid powder. (2) Cholesteatoma. Perforation of abscess of the temporal lobe—characterized by a tense and retarded pulse—into the lateral ventricle; fatal meningitis which ran its course with chills, though the sinuses at autopsy were found normal. (3) In a case of cholesteatoma, chills and high fever were suspicious of a sinus thrombosis. In the absence of external symptoms the perisinuous abscess was simply evacuated. Then the course at first was free from fever, and did not suggest the necessity of a sinus operation—although several symptoms were suspicious of septico-pyæmia: chills, sweating, and jaundice. Eight days later, after repeated rises of temperature, tenderness and glandular swelling along the sterno-mastoid, œdema extending from the posterior margin of the wound to the occiput, the sinus, after previous ligation of the jugular vein, was opened. The sinus thrombosis was found on its way to recovery. A non-diagnosed brain abscess caused a fatal meningitis by perforating into the lateral ventricle. The brain abscess had been suspected, but in a different location. It was found to be situated in a very unfavorable position in the occipital lobe. As the symptoms of the brain abscess did not

become clear until after the sinus operation, it was thought, in the absence of urgent symptoms, best to wait for the healing of the pyæmia, and thus obtain better chances for the operation of the brain abscess. (4) Purulent meningitis, infection through the labyrinth, in a case of chronic middle-ear suppuration. Meningitis proved by lumbar puncture. Notwithstanding high temperature, the retarded and tense pulse was suspicious of a complicating brain abscess. This, however, was found absent at the autopsy. Unusual is the absence of rigidity of the neck, notwithstanding a thick exudate on the cerebellum and at the medulla oblongata, as well as the absence of pathological changes in the eye grounds. Glycosuria of the last days is explained by the ventricle meningitis. (5) Tuberculous otitis media, tuberculous meningitis, both symptoms of general miliary tuberculosis originating in the tuberculosis of the lungs and bronchial lymph nodes. An extension of the tuberculous process from the ear to the cranial cavity was not found. (6) Acute middle-ear suppuration. Suspicion of tuberculous meningitis. Autopsy showed that meningitis symptoms were due to a simultaneous pneumonia which had caused a hyperæmia of the meninges and cerebral œdema. (7) Subacute purulent otitis without tuberculous signs. Death from miliary tuberculosis, independent of the aural lesion.

In conclusion, a tabular review of 125 mastoid operations performed in the clinic is added. The authors draw attention to four cases of chronic purulent otitis which healed with closure of the drum a quarter of a year after the simple mastoid operation according to Schwarze. They considered that in all those cases of chronic purulent otitis with mastoid involvement, which are not complicated with cholesteatoma and present no perforation in the superior and in the supra-posterior quadrant, the Schwarze operation is sufficient.

HAENEL.

135. KÖNIG examined 787 children for changes in the ear, nose, and throat, and examined the hearing with the acoumeter, voice, and tuning-forks:

289 had normal hearing on both sides.

66 had one deaf ear.

432 were deaf in both ears; of these, 135 had only a hearing power of $\frac{1}{3}$, or less.

In only 12, that is $2\frac{1}{2}\%$ of the bilaterally deaf, was the deafness noted.

In 80 cases there were signs of existing or old suppuration, chiefly caused by scarlet fever. Four children were operated upon—two suffered from nervous deafness, 1 from bilateral and 1 from one-sided deafness with stapes-ankylosis.

105 suffered from enlargement of the pharyngeal tonsil; of these, only 15 were able to hear normally. 143 suffered from enlarged faucial tonsil. Interference with nasal respiration was found present in 36 children suffering from chronic rhinitis. Chronic granular pharyngitis occurred in 195.

Most of the children with hearing under $\frac{1}{4}$ had to tell the teacher that they did not always hear distinctly, and consequently were not able to follow the instruction. Of the 404 boys, 60 were even at this time unsuited for military service on account of deafness. Very often, in about 50 % of the cases, the parents of the deaf children suffered also from poor hearing. The appalling amount of ear disease in the country population would make it desirable to have better government inspection.

HOLSCHER.

136. LAUBI examined 22,894 pupils after the methods of Bezold. The results were collected in three tables. The first showed a survey of the entire material; the second, the frequency of the various diseases and the sum-total of various anomalies; the third showed the degree of deafness found in the various diseases. 10 % of the pupils were abnormal as regards their hearing; of these, 27 % were able to hear a whisper in .2m, 23 % in from 2-4m, 49 % in from 4-10m. The practical conclusions derived from this examination do not differ from the well-known opinions on this subject.

BRUEHL.

137. (1) An angio-sarcoma as large as a hen's egg, which was badly situated within a palate in the direct surroundings of the concha; healed after extirpation.

(2) An adeno-carcinoma of the external auditory canal, as large as a pigeon's egg, starting from the sebaceous glands; also healed by operation.

In both cases the facial nerve was exposed and hearing was still present.

(3) A plaster cast in the auditory meatus removed by retraction of the auricle, irrigation of the membranous canal, and dilatation of the bony meatus.

(4) Chronic middle-ear suppuration with cholesteatoma and extensive gravitation of pus, which did not proceed downwards

through the incisure, but along the sinus, the bulb, and the jugular vein. Operation. Recovery. SCHEIBE.

138. FELIX examined the ears of 1050 adults under fifty years, belonging to the poorer classes, who were attending the dispensaries for various internal troubles. 290 were deaf; of these, only 22 complained of loss of hearing. 1038 school children were examined; of these, 327 were found deaf; in only 12 of these had the deafness been noted by the teachers.

OPPIKOFER.

b.—GENERAL PATHOLOGY AND SYMPTOMATOLOGY.

139. Bernhardt. The injuries of the organ of hearing, especially in regard to the nervous system. Forensic monograph. *Vierteljahrsschr. f. ges. Med.*, vol. xxv., and also separately, Hirschwald (Berlin).

140. Patel. Remarks on certain forms of isolated fractures of the petrous bone. *Revue de chirurgie*, 403, p. 483.

141. Pfimlin. On the functional disturbances of the organ of hearing in advanced age. *Inaug. Diss.*, 1903.

142. Kosteljanetz. The relation of diseases of the ear to those of the nose and of the naso-pharynx. *St. Petersb. med. Wochenschr.*, Nos. 13 and 14, 1903.

143. Stirling. The question of nasal treatment for the cure of diseases of the ear. *Laryngoscope*, April, 1903.

144. Wingrave. Tobacco deafness. *Journ. of Laryng.*, April, 1903.

145. Manciola. A case of periodic deafness. *Arch. ital. di otol.*, vol. xiv., No. 2.

146. Würtzen. Pathological changes of musical hearing, and musical perception and expression. *Bibliothek f. Lager.*, vol. iv., p. 155, 1903.

139. This paper is in two parts. In the first, various ways by which death results after an injury to the ear; in the second, the various injuries of the auditory organ are discussed separately. These are in turn divided into those of the sound-conducting and sound-transferring apparatus. The diagnosis of the injuries to the internal ear is treated from a medico-legal standpoint. The traumatic diseases of the ear, of a neurasthenic and hysterical character, are also described. The monograph has also appeared in book form. It is written in a lucid style, and the literature is not overlooked. It will serve as a very welcome source of information to many. BRUEHL.

140. Though most fractures of the petrous pyramid result indirectly from blows on the exterior of the skull, direct fractures are possible. The author has produced a direct fracture experimentally, and shows that the direction of the fissure depends upon the line of the acting force. OPPIKOFER.

141. The author has examined 140 persons over sixty years of age in the Freiburg ear clinic. He finds the most frequent disease of the ear in advanced age is nervous deafness, or an affection of the labyrinth. The perception for the high tones suffers the most; bone-conduction is considerably reduced. The presbyacoustic law of Zwaardemaker holds good for sixty years or more. A part of the cases of deafness may be regarded as increase of the physiologic presbyacousis. A relatively frequent cause of deafness in advanced age is fixation of the stapes.

BRUEHL.

142. Of 1000 ear patients, 671 presented no change in the naso-pharynx. Changes in the nose and naso-pharynx were present in cases of otitis, in 107 (acute 34, chronic 53, residuum, 20); in tubal catarrh, in 161 cases (acute 41, chronic 120); in sclerosis and adhesive processes, in 46 cases; in deafness following intoxication, in 4; in affections of the labyrinth, in 11; collectively, 32.9%. From this etiological result, the importance of naso-pharyngeal disease is recognized in therapeutics. SACHER.

143. Diseases of the ear benefited by nasal treatment are, or have been, Eustachian-tube cases. Such treatment is unprofitable to the patient in cases of pure sclerosis, and in aural catarrh it should be limited to removal of conditions which may be interfering with the recovery of the mucous membrane lying between the nose and the tympanum. The rule followed by the writer is: a nasal operation for the sake of the ear should be one which is advisable for the sake of the nose. CLEMENS.

144. WINGRAVE classified deafness due to tobacco smoking under three heads, according to their etiology:

(1) Mechanical or pneumatic, having its origin in the habit of smoking tightly packed pipes, etc., causing a violent or negative naso-pharyngeal pressure.

(2) Irritative or catarrhal.

(3) Toxic.

Seventeen cases were related.

ARTHUR CHEATLE

145. In a farmer twenty-two years of age, the hearing periodically got worse during the winter, to return again at the onset of spring. According to the author, this periodic deafness was due to vasomotor disturbance in the Eustachian tube, under the influence of peripheric irritations, namely, a change of temperature, and to the atmospheric pressure. RIMINI.

146. The author describes the various forms of diplacusis and amusia, citing typical case-histories from the literature. He adds the following four cases; personal observations:

(1) A lady suffered from an apoplexy, with right-sided paresis; she improved; after some aphasia she endeavored to play the piano; memory for tones and touch for the left hand were perfect; but touch had become lost for the right, while she was perfectly able to write. Later, the ability to play with the right hand returned. The ability to read notes, however, was lost, and there was a simultaneous hemianopsia.

(2) A young physician, otherwise normal, has been unmusical since earliest childhood. Music is a noise to him; he cannot perceive whether the musical selection is sad or light; he cannot remember any melodies; he cannot sing or in any way reproduce a melody; has very little sense of rhythm, and can scarcely dance.

(3) A woman somewhat neuropathic, otherwise healthy, has, since childhood, had no appreciation for music, which she regards as a more or less unpleasant sound; she cannot distinguish between light and heavy music; she cannot reproduce any tones, only inarticulate sounds, and does not remember a single melody; the rhythmic sense is scarcely developed, and she is a very poor dancer.

(4) A ballet dancer suffered from apoplexy, with left-sided hemiplegia; no aphasia, later, partial amusia. The musical memory is not reliable; hearing for purity of sound defective; he cannot sing; he has lost the rhythmic sense entirely. He can read music; but on attempting to play the violin the left hand cannot find the tones, and he does not realize the mistake. On the other hand, he still preserves great delight in hearing music.

The author, on the basis of Lichtheim-Knoblauch's table, describes four groups of musical disturbance depending upon the place where the interference in the sound transmission takes place.

JOERGEN MOELLER.

C.—METHODS OF EXAMINATION AND TREATMENT.

147. **Ostmann.** *a.* The influence exerted on Rinne's test by disturbance of sound conduction in the other ear. *A. f. O.*, vol. lvii., p. 193.

b. The position of the absolute threshold value for bone- and air-conduction in normal hearers, and its relation to the time intervals found in Rinne's test. *A. f. O.*, vol. lviii., p. 82.

148. **Lucae.** On the diagnostic value of tone examinations, with especial regard to the continuous-tone series of Bezold and my own method of examination. *A. f. O.*, vol. lvii., p. 205.

149. **Bergemann.** Ear speculum with attached magnifier. *Deutsche med. Wochenschr.*, 1903, No. 21.

150. **Lucae.** An apparatus to apply the air douche in ear patients. *Deutsche med. Wochenschr.*, 1903, No. 21.

151. **Ballance.** Remarks on the operative treatment of chronic facial palsy of peripheral origin. *British Med. Journal*, May 2, 1903.

152. **Beck.** Superheated medicated air in diseases of the ear and nose. *Laryngoscope*, May, 1903.

153. **Barclay.** How to cure, by a novel method, hopeless cases of deafness and discharge from the ear. *Medical Fortnightly* (St. Louis), March 25, 1903.

147. *a.* **OSTMANN** has examined 32 soldiers with normal hearing by Weber's test, to determine the auditory conduction of one ear for *c* (*i. e.*, the length of perception by air-conduction in maximal vibration of the tuning-fork); and Rinne's test on the same ear while the other was kept open, also when firmly closed. This examination gave the following results:

(1) In Weber's test, after closure of the second ear, the tone, which was previously not lateralized in most cases, could be perceived in the occluded ear.

(2) The normal hearing and the result of Rinne's test varied greatly even in those with normal hearing, and the various degrees of Rinne's test were dependent upon the size of the hearing power.

(3) On closure of the other ear, Rinne's test was influenced so that bone-conduction was prolonged, and the positive value for air-conduction was diminished.

For the practical use of Rinne's test, these observations, in the author's mind, give the following conclusions:

I. Rinne's test is influenced—namely, that the hearing power for bone-conduction is prolonged; and air-conduction appears to be smaller than corresponds to the actual sound conditions of the examined ear, under the following conditions:

(1) In one-sided labyrinthine disease through the other ear, if the latter is normal, or deaf from a sound-conducting disturbance.

(2) In bilateral disturbance of sound conduction on the less affected side, by the more affected ear.

(3) In bilateral labyrinthine disease on the more affected side, through the less diseased ear.

II. (1) Rinne's test is not influenced in one-sided disturbance of sound conduction through the normal other ear.

(2) Bilateral disturbance of sound conduction on the more diseased ear, through the less affected ear.

(3) In bilateral disease of the labyrinth in the less affected ear, through the more affected ear.

b. Ostmann has found, after examining 52 normal ears, that in Rinne's test the total length of perception of the tuning-fork, by air-conduction, is shortened by 9 seconds after placing it on the mastoid process. He recommends a separate test of tone and of air-conduction, if their conditions are to be compared.

HAENEL.

148. LUCAE criticises the method of examining with the Bezold continuous series; he does not find the term "continuous-tone series" is correct, as the tones are separated by an interval of a half tone. Further, he does not consider the choice of instruments to be quite right; the armed tuning-forks have impure tones, and usually have an octave over-tone. Of the armed Edelmann's forks, which Bezold himself uses on account of their freedom from over-tones, Lucae did not examine any of the low forks, and of the others, only the tones c^2 and c^3 , and in these he was not able to prove any over-tones. As the pitch in the Bezold tone series is the least in the deep tones, and the greatest in the high tones, Lucae recommends for the tone examination the opposite conditions, viz., that tone c^2 and c^3 should be produced by tuning-forks, while the deep tones should be produced by pipes or tuning-forks augmented by resonators. In testing with the deepest tuning-forks, Lucae thinks that the function of hearing may be confused with a tactile impression. Lucae recommends that the tone examination be simplified, and that the same should be restricted to musical tones. He describes fully the method which he has practised for years, and gives its worth by citing a number of examples from his practice. HAENEL.

149. Without knowing of the attempts of previous authors, BERGEMANN has constructed an aural speculum. It is connected at its wide end with a cylinder, which receives another cylinder containing at its inner end an exchangeable lens. The distinctness of the enlarged image thus obtained is praised.

NOLTENIUS.

150. LUCAE reports upon experiments which he has made with filtered compressed air, and finds that the various compressed-air apparatuses supply all necessary purposes for an air douche in aural practice. The unpleasant irritations following the careless use of carbonic acid are not present. NOLTENIUS.

151. This is a highly important paper. The history of the joining of the facial nerve to the spinal accessory and hypoglossal nerves is given. Seven cases are related at length with the modes of operation. The conclusions of the authors are:

1. Peripheral facial palsy is remediable by facio-accessory anastomosis, but the extent of recovery appears to be limited to associated movements in conjunction with the shoulder. In most cases the previous deformity disappears when the face is at rest.

2. For reasons above stated we would in future recommend facio-hypoglossal anastomosis rather than facio-accessory.

3. The cases suitable for operation are those in which the paralysis has lasted so long that no recovery is to be expected, say, facial palsy lasting six months without any signs of recovery. In our opinion, the sooner the operation is done after this date the better.

4. A suppurative causal condition producing an infective neuritis renders the prognosis after operative treatment less favorable than in cases due to trauma.

ARTHUR CHEATLE.

152. The volatile medicinal substances found by BECK to give the best results in this form of treatment in ear diseases are formalin, menthol, and chloroform. In chronic hypertrophic otitis and in chronic suppurative otitis, the formalin hot vapor succeeded in curing many cases where other usual means failed. The treatment is applied through a specially constructed apparatus, the temperature ranging from 150° to 200° F. The duration of the treatment varies from three to five minutes. The hot medicated air has also been successfully applied in acute otitis media, acute salpingitis, and furuncular inflammations of the auditory canal.

CLEMENS.

153. BARCLAY considers that ossiculectomy is a universal panacea for all pathological changes found in the middle ear resulting from suppuration or catarrhal inflammation.

CLEMENS.

d.—DEAFMUTISM.

154. Lannois and Chavanne. Results of examination of sixty-five deaf-mutes. *Ann. des mal. de l'oreille, du lar.*, etc., 1903, No. 1.

155. Waldenburg. The isocephalic blond racial element among certain deaf-mutes. Berlin, Calvary and Co., 1902.

156. **Forchhammer.** On the importance of definite methods in the instruction of deaf-mutes. *Habilitationschrift*, Kopenhagen, 1903. J. Friemod's Verlag.

154. The authors have investigated with tuning-forks and the voice, and have arranged their results in a table. They emphasize the fact in the examination with the tuning-forks that the examination with direct bone-conduction was often of value. They find, agreeing with Hartmann, complete deafness in 62 %, and some hearing remnants in 14 %. They have also looked out for the formation of the skull and the teeth, without having come to any important conclusion; unusually frequent, however, the upper incisor teeth projected, which they think is due to the fact that in the speaking exercises in deaf-mute schools the tongue is forcibly pressed against the incisor teeth.

ZIMMERMANN.

155. The author is of the opinion that marriages among relatives is not necessarily a cause of deafmutism, but of abnormal cerebral development. He thinks that, in order to describe the true causes, anthropological and prehistoric investigations should be pursued. He found among Jewish deaf-mutes very many isocephalic and hyperbrachycephalic heads; while in others, with normal development, the usual form of brachycephalia was present. Families which are free from deafmutism have few extreme brachycephalic and more mesocephalic and slightly dolichocephalic heads.

HOELSCHER.

156. The author discusses the various means of communication between deaf-mutes, and thinks that the means of communication should, as much as possible, correspond to true speech. The peculiarities of the speech of deaf-mutes and the instruction in articulation is first discussed. In this part, mention is made of the phonoscope. With the aid of this apparatus, it is comparatively easy to give the deaf an idea of the pitch of their voice. Then the various means of communication are described, which can serve in teaching by the use of speech. In simple lip reading many mistakes are possible. Therefore, in cases of subjects which are more or less unknown to the pupil, it is better to use other means. First of all, there is a form of writing which reproduces true speech and does not differ from the phonetic writing as much as the usual. Then the mouth-hand method, where the various movements of the hand are used to aid lip

reading. These two accessory methods have been of great help in the Nyborger Deaf-Mute Institute.

The book, in brief, is unusually well worth reading, and shows an unusual appreciation for the mental life of the pupils, as well as for the children in general.

JOERGEN MOELLER.

THE EXTERNAL EAR.

157. **Hellatt.** A case of obliteration of both auditory canals by osteomata. Operative removal. *St. Petersburger medicin. Wochenschrift*, 1903, No. 23.

158. **Compairod.** Fibroma of the auricle and of the auditory canal. *Le Progrès médical*, 1903, p. 237.

159. **Grunert.** The etiology of primary interlamellar abscesses of the drum membrane. *A. f. O.*, vol. lvii., p. 200.

157. The patient, thirty-four years of age, presented a complete occlusion of both auditory canals by bony tumors. These were multiple, and appeared to rise from the anterior and posterior walls. As they adjoin each other closely, it is difficult to exactly localize them. Hearing: whisper, on both sides, $1\frac{1}{2}$ metres. At operation the usual incision was made, and the cartilaginous and membranous canals were retracted. Both auditory meati were completely obliterated. A new opening had to be made into the bone, which proved to be very difficult, especially in the attempt to preserve the proper lines of direction. Also, the depth was difficult to estimate. On the left side, recovery was uneventful, the hearing returned to normal; on the right, after a short suppuration, owing to the opening of the drum cavity, the drum closed, but the hearing power did not improve.

SACHER.

158. The tumor, as large as a pigeon's egg, closed the left canal and was attached with a broad pedicle to the auricle. It was removed in local anæsthesia. Microscopically it proved to be a fibroma.

OPPIKOFER.

159. GRUNERT reports a case in which the patient had made a number of attempts to remove cerumen from his ear. Oil drops had been repeatedly instilled in the ear. The tympanic cavity was free from inflammatory symptoms. In the abscess numerous streptococci were found.

HAENEL.

THE MIDDLE EAR.

a.—ACUTE OTITIS.

160. **Toeroek.** Paralysis of the sixth nerve during a course of acute otitis media. *A. f. O.*, vol. lvii., p. 188.

161. **McCaw.** The treatment of acute mastoiditis and its influence on audition. *Laryngoscope*, April, 1903.

162. **Heermann.** Acute necrosis of the mastoid process and of the petrous bone, after scarlet fever. *Münch. med. Wochenschr.*, 1903, No. 22.

163. **Blau.** Retropharyngeal abscess after acute otitis media. *Deutsche med. Wochenschr.*, 1903, No. 14.

164. **De Stella.** A study of the aberrant mastoid cells. *La Presse otolaryngologique Belge*, 1903, No. 2.

160. In the case of an acute purulent otitis, which was associated for some time with inflammatory symptoms in the mastoid process and with labyrinthine symptoms, a paralysis of the sixth nerve on the same side appeared. As the paralysis disappeared with the healing of the aural suppuration, the connection between the two affections seems probable. According to the author, the inflammatory process extended to the apex of the petrous bone, either along the pars petrosa or along the carotid canal.

HAENEL.

161. **McCaw** has failed to find any reference in the literature to the influence of acute mastoiditis on audition. According to the statistics presented in this paper, those cases operated upon during the first week of the disease show $72\frac{1}{2}$ per cent. of recoveries with normal hearing (18 cases: 13 with normal hearing, 5 with little improvement of hearing). Of those operated upon in the second week, 60 per cent. recovered with normal hearing, $13\frac{1}{2}$ per cent. with severe deafness (15 cases: 9 with normal hearing, 4 with slight, and 2 with intense deafness). During the third week $16\frac{2}{3}$ per cent. recovered with normal hearing, 50 per cent. with severe deafness (6 cases: 1 case with normal hearing, 1 with slight, 3 with severe deafness) and 1 death from meningitis. The percentage of severe deafness and the diminishing percentage of recoveries to normal hearing, as the duration of disease increases, are considered a very strong argument in favor of early operative measures in all cases of acute suppurative tympano-mastoiditis.

The conclusions offered are the following:

1. Great reliance can be placed on abortive measures in the hemorrhagic variety of acute tympano-mastoiditis following influenza with a reasonably certain prognosis of normal hearing. In no other form of the disease can this be done.

2. The period of the disease at which appropriate treatment is applied influences the ultimate functional result.

3. In all cases requiring operation, the earlier we attack them surgically the greater will be the amount of hearing recovered.

4. The dry method of post-operative treatment seems to influence the function of audition, but to a less extent than early surgical interference.

	Number.	Cut Short.	Without Operation.	With Operation.
Ad. 1.				
Influenza { a. hemorrhagic...	10	10	10	0
{ b. purulent.....	31	20	0	31
Acute coryza.....	4	4	2	2
Measles.....	4	4	1	3
Scarlet Fever.....	3	0	0	3
Ad. 4.				
Dry method.....	27	17	7	1
Syringing.....	12	6	1	44

CLEMENS.

162. HEERMANN reports on thirteen cases of necrosis in acute purulent otitis after scarlet fever. This apparently large number of cases is due to the fact that in Holstein unusually severe epidemics of scarlet fever are not uncommon. The soft parts over the mastoid process were but little involved; the drum membrane rapidly disintegrated; there was some rise of temperature. The bone necrosis had, in one case, appeared on the second day of the disease. In the three cases which were examined bacteriologically, streptococci and staphylococci were found present. In one autopsy the tegmen tympani was found perforated and the bone gray and black to a large extent underneath the intact dura. The author favors early operation. He assumes that similar necrosis may occur after other acute infectious diseases. The reviewer, however, would like to state that necrosis in acute purulent otitis is not so uncommon as the author appears to think; in literature there are a number of reports of cases occurring in scarlet fever, measles, and diabetes, and a histologically examined case has been reported by the reviewer; and three years ago, at the meeting of the German Otological Society, the reviewer read a paper on the "Etiology of Necrosis in the Course of Acute Purulent Otitis."

SCHIEBE.

163. A child one year old, on the fifth day of a left-sided facial otitis, suffered from a pharyngeal abscess on the same side. It was in connection with the middle-ear process; on pressure being exerted on the abscess, profuse discharge appeared from the ear. The abscess was incised and evacuated, and was healed in eight days. The author believes that the pus travelled from

the middle ear to the retropharyngeal tissue along the canal for the tensor tympani muscle. NOLTENIUS.

164. Reports on two cases of inflammation of aberrant mastoid cells. In the first, the inflammation had affected a cell situated posterior to the mastoid process, without causing any special symptoms. At operation, the antrum was found normal, though infection of the meninges led to death. In the second case, the aberrant cell was separated from the antrum by a bony partition $1\frac{1}{4}$ cm thick. It was situated behind and above the sinus, and it produced an extradural abscess. In this case the site of the cell was designated as a "tender spot" by the patient, and this led to an opening at operation. The symptom of these aberrant cells is an exactly localized pain, which is a valuable though an inconstant symptom. The local swelling, which is often distinct, will differ from the general swelling of the mastoid process. The aberrant mastoid cells are situated posterior in the antrum of the sinus and cerebral abscess. Anatomically, they have been found present by De Soutre in more than one-half of the cases. This author found them to communicate in the majority of cases with the antrum. DE STELLA, when aberrant cells are not suspected, only exposes the antrum and the diseased cells. If the fever does not cease, then the entire mastoid process is searched for these remote cells. BRANDT.

b.—CHRONIC PURULENT OTITIS.

165. Gray. A new method of treating suppurating catarrh of the middle ear. *Lancet*, April 18, 1903.

166. Reik. The prognosis of chronic otorrhoea. *Maryland Medical Journal*, April, 1903.

167. Ballance. A fragmentary contribution to the operative treatment of chronic suppuration within the temporal bone. *Lancet*, April 11, 1903.

168. Kohlmeyer. On the etiology of aural polypi. *Dissertation*, Breslau, 1902.

169. Nolte. The methods of radical operation in chronic purulent otitis. *Inaug. Diss.*, 1902, Freiburg.

165. The ear is first syringed out and dried carefully with pledgets of cotton wool on a probe. Five minims of a saturated solution of iodoform in anilin oil are then soaked up on a small piece of cotton wool and applied to the affected area with forceps and left in position for about five minutes; the excess of the solution after removal of the plug is then removed from the walls of the meatus, but not from the tympanum. The application is

repeated twice, or at most three times, in a week. The solution after a time turns crimson in color, when it becomes useless for surgical purposes.

ARTHUR CHEATLE.

166. REIK believes that with proper care and thorough treatment the cure of chronic suppurative otitis is not so hopeless as many seem to regard it. About 50 % of the cases call for some surgical treatment, either of major or minor degree, including among the latter removal of polypus and cauterization of granulation tissue. Where the ordinary means employed in treatment do not bring about a favorable result, it will be found in most instances that necrosis of the ossicles exists, and removal of the diseased bones will permit a cure, through improved drainage and better cleansing of the tympanum. It is stated that about 50 % of the one-half requiring operation will be cured in this way. The radical operation will have to be performed in the remainder, and as surgeons become more familiar with the technique of this operation, the small percentage of cases now considered incurable will be still further reduced.

CLEMENS.

167. In this paper BALLANCE describes his method up to date. The scheme he now adopts is:

1. The removal of the disease and the fashioning of the meatal flap.
2. One week later the epithelial grafting operation.
3. A few days (from the sixth to the ninth) after this—and the earlier the better after the graft has taken,—the removal of the dead portion of the graft as a deliberate measure.
4. Dry gauze tamponing through the meatus until the gauze comes away unstained.

ARTHUR CHEATLE.

168. KOHLMEYER distinguishes between naked polypi—that have epithelium on the surface; transitional polypi—with partial epithelium covering; and those which are completely covered with either squamous or cylindrical epithelium. The naked polypi contained foreign bodies, epithelial scales, or hair. These foreign bodies can therefore be regarded as the cause of the polypi-formation. In the treatment of middle-ear suppuration it is therefore very important, from a prophylactic standpoint, to cleanse the middle ear as thoroughly as possible. The histological details must be read in the original.

HOELSCHER.

169. NOLTE describes the operation as practised in the Freiburg Clinic, which combines the advantages of the Zaufal and

Stacke methods. The posterior canal wall is first removed in its lateral part; then, following Stacke's method, the lateral wall of the attic is removed and the intervening bone between the canal and the antrum resected. After exposure of the operative field the auricle is split in "T" shape, and the cutaneous wound is sutured.

BRUEHL.

C.—CEREBRAL COMPLICATIONS.

170. **Krause.** On exposure of the posterior surface of the petrous bone and of the cerebellum. *Bruns, Beiträge zur klin. Chir.*, vol. xxxvii., No. 3.

171. **Streit.** A method to expose deep-seated epidural abscesses, proceeding from the apex of the petrous pyramid. *Arch. f. Ohrenheilk.*, vol. lvii., p. 169.

172. **Goris.** A case of cerebral surgery for complication of chronic purulent otitis. Recovery. *Ann. des mal. de l'or., du lar.*, 1903, 1.

173. **Rimini.** Two cases of cerebral abscess, following chronic purulent otitis. *Arch. ital. di otol.*, vol. xiii., No. 3.

174. **Wilson.** Case of temporo-sphenoidal abscess and lepto-meningitis, showing remarkable latency of symptoms. *Brit. Med. Journ.*, May 2, 1903.

175. **Lermoyez.** Otogenous cerebellar abscess. Operation; recovery. *Ann. des mal. de l'or., du lar.*, 1903, 1.

176. **Frey.** Contribution to the study of otitic cerebral abscess. *Arch. internat. d'otol.*, etc., 1903, S. 306.

177. **Laurens.** Cerebral and cerebellar abscesses, with phlebitis of the lateral sinus, of aural origin. Operation; recovery. *Ann. des mal. de l'or., du lar.*, 1903, 2.

178. **Grant.** Case of cerebellar abscess following middle-ear disease. *Brit. Med. Journ.*, May 2, 1903.

179. **Angus.** A case of cerebellar abscess and thrombosis of the lateral sinus. Operation; recovery. *Brit. Med. Journ.*, April 4, 1903.

180. **Willis.** Thrombosis of the lateral sinus; general septic infection. Venous transfusion; recovery. *Lancet*, June 13, 1903.

181. **Guttman.** A case of epidural abscess of otitic origin. Operation; recovery. *N. Y. Med. Journ.*, May 9, 1903.

182. **Molinie.** Thrombophlebitis of the lateral sinus. *Arch. internat. d'otol.*, etc., 1903, p. 348.

183. **Duroux.** Mastoiditis, thrombophlebitis of the lateral sinus and of the internal jugular. *Lyon méd.*, 1903, p. 981.

184. **Zanfal.** On exposure and irrigation of the bulb of the jugular vein in the operation for septic sinus thrombosis. *Arch. f. Ohrenheilk.*, vol. lviii., p. 131.

185. **Grossmann.** An unusual condition in cholesteatoma and sinus thrombosis. *Deutsche med. Wochenschr.*, 1903, No. 24.

KRAUSE reports: (1) A case which he had operated on with Jansen in May, 1902, of a deep-seated subdural collection of pus on the posterior surface of the right petrous bone. On ac-

count of an empyema of the mastoid process after acute otitis the antrum was exposed, and later the typical radical operation was performed. The course at first was normal; then fever— 39.6° C.,—severe right-sided frontal headache and rigidity of neck set in. There was no pain on pressure, or percussion; the eye grounds were normal; right paresis of the abducent nerve, later photophobia; pulse nothing characteristic; bowels regular. Operation: After making a von Bergmann flap, the dura was removed from the upper surface of the petrous bone, the brain and the dura were elevated by a Krause spatula—some bleeding from a rupture into the superior petrosal sinus. Pus appeared from the depth; the dura was separated from the posterior petrous surface, and a very large, deep-seated subdural abscess was evacuated. The diseased focus was found at the posterior and upper margin of the petrous pyramid. It was removed. The cavity at operation was 7.8cm deep.

After the operation, turning of the body and of the head towards the affected side, and facial paralysis. Good recovery. Krause reports that the von Bergmann incision suffices for extensive exposure of the posterior surface of the petrous bone. The one-sided frontal headache, without pain on pressure or percussion, is of diagnostic value. [One-sided frontal headache without pain on pressure also occurs in other intracranial diseases—for instance, in cerebellar abscess.—Reviewer.]

To simplify the exposure of these deep lesions the combined raspatory curette as advised by otologists, might be of value.

(2) Intradural section of the right acoustic nerve on account of persistent tinnitus with deafness on the same side. The intradural way was selected because of danger of severe injury to the sigmoid and to the superior petrosal sinuses and to the facial nerve in the subdural method. Operation: A large flap composed of skin and bone is made, the size of one-half of the cerebellum. A large dural flap is then made by an incision along the lateral, the transverse, and the occipital sinuses. The flap is turned down, the right cerebellar lobe is elevated to the left side—some hemorrhage, which was arrested by packing. The posterior surface of the petrous bone was easily visible. The acoustic nerve was then divided. The flap was sutured.

After the operation, slight facial paralysis. The tinnitus continued for a time, but decreased after the third day. On the fourth day pneumonia set in, to which the patient, who was sixty-

three years of age, succumbed. At autopsy the wounds were healed primarily, and there was no meningitis.

(3 and 4) Two cases of exposure of both cerebellar lobes on account of a supposed cerebellar tumor.

In the first case—in two sittings each cerebellar half was exposed by reflecting a large flap composed of skin and bone and a large dural flap. The cerebellar lobe was then divided as in an anatomical section. No tumor was found. The operations were well borne by the patient, who was a boy eleven years of age. Owing to the reduction of intracranial pressure, some relief in the symptoms followed. Death after three years. No tumor was found at autopsy, but an internal hydrocephalus. Unusual softening of the distended brain.

In the second case, both cerebellar halves were simultaneously exposed by the formation of a large flap. After a double ligation the occipital sinus was divided. A large dural flap was formed by an incision below the transverse sinus, and turned down. The tentorium cerebelli was elevated with the brain spatula, thereby permitting a survey and palpation of the upper surface of the cerebellum. No tumor. Anatomical section through the right cerebellar half. The left lateral ventricle was punctured and 200ccm of liquid evacuated. Transient collapses. Suture of the dural flap. The dura and cutaneous wounds were closed. No special post-operative disturbances. Sudden death on the sixth day. At autopsy the wound was found in good condition. An unusually marked deformity of the base of the skull. Chronic endymenitis. Internal hydrocephalus.

Krause emphasized the broad exposure and extensive division of the cerebellum, as otherwise no survey is possible, and the tumor cannot be found. If time is to be spared, the bone should be sacrificed. The ligation of the sinus, which may be of importance to the otologist, is made by passing a suture around it after an incision in the dura vertical to the sinus has been made in order to determine its extent. To expose an otitic cerebellar abscess, the old method of a search from the posterior petrous surface is probably the better.

HOELSCHER.

171. STREIT describes an operation to expose deep-seated collections of pus especially situated underneath the Gasserian ganglion. He considers this to be without danger, as a result of his trials on cadavers, and recommends it for exploratory operations. He has thus far not been able to perform the operation on the living.

The cutaneous incision passes around the auricle, beginning in front $1\frac{1}{4}$ cm above the tragus; a second incision passes up and back in the direction from the supra-meatal spine to the point of junction of the lambdoid and sagittal sutures, and is 3 cm long. After retracting the auditory canal from the bony canal and exposing the middle-ear cavities, the upper bony wall and the base of the zygomatic process is resected, and the dura is exposed to an extent 3 cm above this. After the removal of the roof of the tympanum and the antrum the dura is laid free in the form of an oval $2\frac{1}{2}$ x 2 cm. With a dural spatula the dura is elevated from the bone internally from the tegmen tympani. The horizontal semicircular canal should always be visible between the branches of the spatula.

The patient is then changed to a half-sitting posture and inclined to the operative side. An adhesion at the hiatus spurius and at the superior margin of the petrous pyramid forms a pocket in the dura which leads the spatula to the Gasserian ganglion, which can be removed with the aid of Streit's raspatory curette. This instrument also serves the purpose of separating adhesions, as well as to remove granulations and carious bone. The distance from the route of the zygomatic process to the Gasserian ganglion is from 4.5–2.7 cm, averaging 3.5; the distance to the apex of the pyramid is but 5.5, averaging 4.2–4.5 cm.

Streit believes that in his operation a dangerous pressure on the brain can be more easily avoided than in the Krause operation. Hemorrhages may take place from the posterior branch of the middle meningeal, as well as from the petro-squamous sinus. Hemorrhage from a carotid artery can be avoided with some care.

If the Streit operation has disclosed such an extensively diseased focus that this method does not suffice, then a more extensive procedure can be attempted. HAENEL.

172. GORIS's case is unusual, inasmuch as nothing pointed to the ear. There was headache behind the eyes and diplopia of a month's standing. In addition to the paralysis of the oblique there was a double-sided optic neuritis. As no sufficient cause could be found from the nose, the ear was examined, and an old chronic suppuration was discovered. The focus in the ear was first eradicated, and then a large trephined opening was made in the squama and the lower surface of the temporal lobe exposed. In the above, probably at the apex of the pyramid, a movable

sequestrum was found, on the removal of which the symptoms rapidly disappeared and complete recovery followed, which remained unchanged four months later. ZIMMERMANN.

173. After describing the clinical course and the autopsy report of two cases of otitic brain abscess, lumbar puncture is spoken of as a very important means for differential diagnosis between meningitis and brain abscess.

AUTHOR'S ABSTRACT.

175. After a complete description of this successful case, the author remarks upon how difficult it often is to diagnosticate the abscess unless the left side is affected—as in the present case—and aphasic symptoms are produced. One would be inclined to make a diagnosis, if after the evacuation of an extradural abscess weakness and emaciation of the patient continued. As regards operation, the author recommends removing the original site of the disease, then exposing the brain abscess, *not* from the ear, but through the trephined opening in the squama.

ZIMMERMANN.

174. The patient was a man aged twenty-two years, who was admitted under Mr. Alexis Thomson in the Edinburgh Royal Infirmary in August, 1900. At the age of seventeen he had a blow behind the right ear; a month later he had occasional pain on the right side of the head for six months, when it suddenly increased in severity, and the ear began to discharge. In the autumn of '97 he had influenza, which caused the pain and discharge to increase; the former gradually subsided, but as the ear continued to discharge, he was admitted on August 22, 1900. There were no mastoid symptoms or signs at 3 P.M. At 6:30 he went to bed after helping to bring in the ward tea, feeling in his usual health. At 7:15 he complained of a slight ache in the occipital region; at 7:30 the pain had greatly increased and he lay on his right side, holding the back of his head with both hands. The head was retracted. The knee jerks were abolished. No tremors, paralysis, strabismus, or photophobia. The pupils were rather contracted, equal, and reacted very sluggishly to light. Pulse 90 Temp. 99° F. At 7:45 vomiting commenced, and he was very restless. At 9:15 Thomson operated. The antrum contained very offensive pus; while following the antrum into the middle ear there was a sudden rush of about 1½ ounces of stinking pus, which apparently escaped from an abscess in the temporo-sphenoidal lobe through an opening in the tympanic cavity.

A tube was inserted. He died at 8 A.M. on the next day. At the post-mortem examination extensive purulent meningitis was found at the base over the pons, medulla, and cerebellum, and extending up the Sylvian fissure on both sides of the cerebrum. The right temporo-sphenoidal lobe was occupied by an abscess lying to the outer side of the descending horn of the lateral ventricle. An opening was found in the abscess wall and dura corresponding with the opening in the roof of the tympanic cavity.

ARTHUR CHEATLE.

176. Four cases of abscess of the temporal lobe following chronic purulent otitis.

1. A man of twenty-five years of age, left-sided abscess, producing periods of excitement and aphasia; high fever— 39.4° C., retarded pulse, motor weakness in the right hand. After evacuation of abscess the temperature still varied and the psychic disturbance increased. Recovery after nine weeks; the patient, however, who was formerly a good accountant, could no longer multiply.

2. A man twenty-eight years of age, suffered from periodic insanity following left-sided chronic purulent otitis; a subdural periosteal abscess developed on the squama. As after the evacuation of this abscess and opening of the mastoid process the temperature did not fall, and right-sided facial paralysis and aphasia set in, a second operation was performed, and the abscess was found in the temporal lobe. One day later death from cerebral œdema. Lumbar puncture performed one day before death showed clouded fluid containing bacteria. At autopsy the meninges were found unchanged, but a circumscribed meningitis was present in the lower part of the spinal cord.

3. A man twenty-five years of age, with a bilateral chronic purulent otitis on the right side, with cholesteatoma and abscess in the temporal lobe as large as a small apple. Psychic disturbance right-sided, pain in the ear and in the head, paresis of the right elevator of the eyelid, right mydriasis, hemiopia, Romberg's phenomenon, increased patellar reflexes, ankle clonus; operation; recovery.

4. Abscess in the left temporal lobe without focal symptoms. The operation exposed the abscess. Eight days later it was spontaneously evacuated. Death.

FREY concludes as follows: At a time when the abscess does not produce any focal symptoms the brain tissue in the surrounding

parts of the abscess is œdematous to a marked degree. As œdema of the brain rapidly leads to death, the diagnostic incisions into the brain tissue should be made as early as possible, and the focal symptoms should not be waited for. Fever can be present in uncomplicated brain abscess. Lumbar puncture cannot be used to decide whether operation is still indicated. Disturbance of the sensorium is a frequent symptom of brain abscess. The abscess should be exposed from the middle ear, and not from the squama. Examination of the abscess cavity with the finger, if carefully performed, does no harm, and simplifies the evacuation of the abscess. **OPPIKOFER.**

177. A woman, twenty-nine years of age, two months ago had suffered from a right-sided purulent otitis after influenza. After cessation of the discharge, headache, emaciation, rigors, set in with fever, and finally with slight stupor. Lumbar puncture gave a clear fluid under normal pressure. An examination for cells and bacteria was not made. After ligating the apparently healthy jugular vein, the mastoid process was opened, the sinus and a perisinuous abscess opened, and a cerebellar abscess was evacuated through the sinus wall at a depth of 2cm. During the first ten days, the progress was favorable, then severe headache was complained of, located in the region of the antrum; the pulse was retarded, and fever set in. The roof of the antrum was then removed; the dura was found discolored—green,—and an abscess in the temporal lobe was evacuated, containing a coffee-spoon of pus. Gradual recovery—which condition remained unchanged five months later. **ZIMMERMANN.**

178. A man aged twenty-six years had suffered from slight discharge from the left ear. The radical mastoid operation was performed on account of occipital pain, high temperature, etc., the cells were full of pus and the bone of the sigmoid groove was eroded, exposing the lateral sinus, which contained fluid blood. The patient was relieved, but on the thirty-ninth day after the operation the headache returned and vomiting set in with prostration and marked fall of pulse rate. A further operation was decided on. Under the anæsthetic, respiration ceased; the cerebellum was quickly exposed, and explored with a hollow needle; as nothing was found, the temporo-sphenoidal lobe was explored, also with a negative result. There was no bulging on exposure and the brain pulsated. Thirty-two hours later he died. At the post-mortem examination an abscess, containing

about a drachm or a drachm and a half of pus, was found in the cerebellum in contact with the lateral sinus just beyond the sigmoid groove. There was little doubt that the needle passed through the abscess wall, but must have become blocked.

ARTHUR CHEATLE.

179. A boy after having had a cerebellar abscess opened, developed lateral sinus thrombosis, necessitating removal of the internal jugular vein from clavicle to mastoid.

ARTHUR CHEATLE.

180. WILLIS was unable to get below the clot in the internal jugular vein, and the rigor and high temperature persisted. Recovery took place after two transfusions of three pints of saline solution and one ounce of brandy into the median basilic vein.

ARTHUR CHEATLE.

181. The patient, female aged fifteen, developed acute otitis media following a cold. There was severe pain, a temperature of 103° F., accompanied by vomiting and a chill. No swelling over the mastoid, but it was sensitive on pressure over the region of the emissary veins. Shrapnell's membrane was much swollen and bulging; it was incised and thick creamy pus evacuated. Relief followed for a few days only, when the headache, vomiting, stiffness of the neck, and stupor reappeared. Mastoidectomy was performed, and on entering the antrum much pus was found. A fistula was discovered in this region which, being enlarged, a stream of pus mixed with blood rushed out under high pressure. After evacuating the pus the dura was found covered with a thick, villous, fatty, grayish-colored granulation tissue. The lateral sinus could not be found. In five months the case had entirely recovered.

CLEMENS.

182. A patient had suffered since childhood from otorrhœa, and came to operation after facial paralysis and chills had set in. After the first few blows of the chisel, the breathing suddenly stopped. Artificial respiration was continued for two hours, and though the pulse remained fairly good death ensued. At autopsy, the pre-supposed abscess was situated at the lower surface of the cerebellum. The author believes that infection travelled along the aqueductus vestibuli to the posterior cranial fossa, and that the sudden paralysis of the respiration centre was caused by increased intracranial pressure.

NOLTENIUS.

183. From a study of thirty-two cases of uncomplicated

meningitis, as shown by autopsy, the author investigated the various symptoms as regards their frequency and their diagnostic importance, and concluded as follows:

The various symptoms do not offer anything characteristic for purulent meningitis. A pathognomonic symptom does not exist. The simultaneous presence of a number of symptoms makes a diagnosis possible in pronounced cases. Schwartz states, with right, that the onset of a severe disturbance of the sensorium, with clonic and tonic convulsions of the extremities, or hemiplegia, make the diagnosis unquestionable. Inasmuch as purulent meningitis of itself may be difficult to diagnosticate, the diagnosis becomes still more difficult if the meningitis is of otitic origin, as the ear disease may present all the symptoms of a meningitis—as in retention of pus in the tympanum, or disease of the labyrinth. The differentiation of the various intracranial complications of the middle ear is often impossible from clinical observation alone. An early diagnosis of otitic meningitis has been made possible by the introduction of lumbar puncture. Proof for the presence of diffuse purulent meningitis, according to the recent experiments of the clinic in Halle, is furnished—not by the presence of increased leucocytes in a cloudy cerebro-spinal fluid, but by the presence of bacteria in this fluid. To determine the presence of bacteria, in the first place, a smear is necessary. This change in the opinion of the clinic was the result of four cases, in which lumbar puncture showed a cloudiness of the spinal fluid, increased leucocytes but no bacteria, where the conditions found present at operation, and the subsequent course, excluded diffuse purulent meningitis. In pronounced meningitis, it has never been possible in the clinic at Halle to save the patient's life. Notwithstanding, the author reports two cases of unquestionable meningitis—as was proved by the bacteriological examination—where without any operation, the meningitis was recovered from. It is uncertain whether the lumbar puncture in these cases exercised any favorable therapeutic influence. The standpoint of the clinic in Halle, from a therapeutic view-point, is as follows: A cloudiness of the puncture-fluid not produced by leucocytes does not in itself contra-indicate an operation. Even the microscopic determination of the increased leucocytes in the spinal fluid cannot give an indication against operation where the operation is indicated from the condition of the ear or from the general state of the

patient. If bacteria, however, are found present, as in the case of pronounced diffuse purulent meningitis, the author considers operations in these cases to be to-day in general contra-indicated. The thirty-two case-histories follow. HAENEL.

184. The mastoid process was opened in a left-sided acute otitis media, and a normal sinus was injured. The wound was packed; three days later the jugular vein was resected and the sinus was opened, on account of thrombo-phlebitis. Recovery. OPPIKOFER.

185. A patient, twenty-six years of age, suffered from a right-sided chronic purulent otitis with thrombosis of the lateral sinus and of the internal jugular vein. Temperature (40° C.), headache, vertigo, and chills; no metastases. The thrombi were removed from the sinus, and the vein later was ligated. Recovery. OPPIKOFER.

186. ZAUFAL recognizes in Grunert's operation for the methodic exposure of the bulb of the jugular vein a distinct advance. In the cases where on account of unfavorable anatomical relations Grunert's operation cannot be performed, PIFFL has suggested exposing the bulb from the floor of the tympanum. This latter procedure is somewhat easier of execution, though Grunert's operation has the advantage of a complete uninterrupted exposure of the sinus, the bulb, and the jugular vein. The irrigation of the vein and of the bulb from the peripheric part of the jugular vein, mentioned by Grunert, was suggested by Zaufal in 1884. The latter author considers it to be indicated only in cases where the venous channel is not entirely filled with thrombi. HAENEL.

187. The patient, twenty-six years of age, was admitted to the clinic on account of right-sided otorrhœa since childhood. The otorrhœa had not been excessive, nor fetid, and had completely ceased after the removal of a small polypus which was situated up and back at the margin of the vestibule, passing into the aditus. Before admission, the patient had suffered considerably from severe sweats, so that his general condition suffered. There had been no rigors. On the following day two very severe chills occurred. The temperature rose to 41.3° C., and it was decided to operate. In the sclerosed bone two cholesteatomas as large as peas were found surrounded by a matrix. In the region of the tegmen antri, the bone was broken through, and the matrix firmly adhered to the dura. The hori-

zontal semicircular canal showed a defect $1\frac{1}{2}$ mm long, the incus was carious, the hammer healthy, presenting two small granulations at the head. A prolongation of the cholesteatoma extended between the dura and the bone in the direction of the apex of the pyramid. Puncture of the sinus, which appeared externally normal, gave dark, unchanged blood; in the wall of the upper knee, a very small cholesteatomatous pearl, and not far away, two additional and larger ones were found. On the following days the general condition was much improved, but the temperature remained up. At the second operation, the entire extent of the sinus which had previously been exposed, appeared yellowish-gray, and did not pulsate. The opening of the sinus presented a blackish-gray, non-fetid thrombus. Recovery was uneventful. The author considers this, therefore, a case of multiple primary cholesteatoma of the dura, of which the largest had perforated through the tegmen of the antrum. At the first operation, a parietal sinus thrombosis was presented, situated at the place where the small cholesteatoma pearl was found. The author draws attention to the fact that in this case recovery took place without ligature of the jugular vein.

NOLTENIUS.

d.—OTHER MIDDLE-EAR DISEASES.

188. Gillman. Intratympanic injections of pilocarpine in chronic catarrhal deafness. *Jour. Michigan State Med. Society*, April, 1903.

189. Trow. Mastoiditis due to gonococcus. *Canadian Practitioner and Review*, March, 1903.

190. Collet and Beutter. Syphilitic periostitis of the mastoid process. *Lyon Médical*, No. 19, p. 785.

188. GILLMAN has been using this form of treatment for several years, and while he has not observed any remarkably favorable results accruing from its use, he has, nevertheless, secured some gratifying success. He has observed that when pilocarpine is used with other treatment there are cases where it proves absolutely effective; while in other cases it appears to simply avert the worst consequences, and still in a third class of cases the disease fails to respond to the drug's influence. CLEMENS.

189. Patient, male, aged twenty-two, although anæmic and not at all vigorous, never had gonorrhœa or other venereal disease. A few months before he was seen by the writer a small lump appeared in the submaxillary region associated with sore throat, which continued for a week or two, and was then fol-

lowed by a sharp pain in the right ear. Subsequently a slight swelling behind the right ear was noticed, and at the same time a creamy discharge from the ear and nose occurred. The swelling over the mastoid extended some distance below the tip; the skin was normal in color, showing some pitting on pressure. There was no bulging of the posterior wall. The swelling of the soft tissues disappeared by using the ice-bag, but returned shortly after it was removed. Pain was never a marked symptom. The mastoid was opened and found to be entirely carious, the lateral sinus bathed in pus, and a fistulous opening through the medial plate leading into the neck. Some half dozen examinations of the pus were made with uniform results. Incubation at 37.5° C. for thirty-six hours showed a growth which on staining proved to be a non-capsulated diplococcus. [This was probably the pneumococcus lanceolatus. The gonococcus Neisser loves only the mucous membranes of the uro-genital and ocular mucosæ.—ED.]

CLEMENS.

190. A woman, fifty-three years of age, without any history of syphilis, was treated in the dispensary in December, 1902, on account of painful periosteal swelling over the right leg, which disappeared after two weeks of mercurial inunctions and iodide of potash. After a month, three periosteal swellings appeared at the same time—one over the previous site, on the right tibia; the second, on the inner surface of the left thigh; and the third, over the posterior part of the left mastoid process—which was unusually tender. Headache, especially at night; no fever; auditory canal and tympanum normal. Iodide of potash (60 grains per day) and mercurial inunctions were prescribed. Recovery after three weeks.

OPPIKOFEK.

THE NERVOUS APPARATUS.

191. Babinski. Lumbar puncture in the treatment of aural affections. *Deutsche med. Wochenschr.*, No. 23, 1903.

192. James, Alexander. A case of so-called acute labyrinthitis (Volto-lini). *Lancet*, June 6, 1903.

191. Eight cases of disease of the labyrinth with Ménière's vertigo were treated with benefit by BABINSKI with lumbar puncture. The subjective symptoms like tinnitus were improved. In some of the patients mental disturbances, associated with the aural lesion, disappeared after puncture. According to the author, in all the chronic aural conditions, if the labyrinth is not destroyed, lumbar puncture should be tried.

HARTMANN.

192. The case was shown by JAMES at a meeting of the Edinburgh Medico-Chirurgical Society. A girl, aged thirteen years, was seized with illness in December, 1902, complaining of severe occipital pain with fever and great pain on moving the head, and stiffness of the back muscles. Vomiting was almost constant, and she became comatose in two or three days. She recovered in about ten days with hearing greatly impaired, the function soon being completely lost. He also showed a boy, aged seven, who was suddenly seized with vomiting and headache, and in whom blindness instead of deafness resulted. The cases were thought to be an abortive form of epidemic cerebro-spinal meningitis.

ARTHUR CHEATLE.

(To be continued.)

NOTICES.

THE THIRTEENTH ANNUAL MEETING OF THE GERMAN OTOLOGICAL SOCIETY will be held in Berlin, on May 20 and 21, 1904.

THE TENTH ANNUAL MEETING OF THE AMERICAN LARYNGOLOGICAL, RHINOLOGICAL, AND OTOLOGICAL SOCIETY will be held in Chicago, Ill., on May 30, 31, and June 1, 1904, under the presidency of Dr. NORVAL H. PIERCE.

Dr. GORHAM BACON has been appointed Clinical Professor of Otology in Columbia University, to succeed Prof. A. H. BUCK, resigned.

A SPECIAL CLINIC FOR DISEASES OF THE EAR, NOSE, AND LARYNX has been organized by the Bordeaux faculty, under the direction of Dr. Moure. This is the first clinic for this specialty in the French universities.

ARCHIVES OF OTOTOLOGY.

NASAL FIBROID.

By HILLIARD WOOD, M.D., NASHVILLE, TENN.

(With two illustrations on Text-plate I.)

FIBROID tumors of the nose are sufficiently rare to justify the report of the following exceptionally severe case.

February 20, 1904, Dr. A. M. Belcher, of Richelieu, Ky., brought to me the case described below.

I. M., aged fifteen years, female, white, apparently in good general health. She gave the following

History.—Two years since the first symptoms developed in the form of pain about the face and forehead, and nasal obstruction. This pain was severe and she remained in bed for three months, being treated for "neuralgia." Later the pain subsided and has not since been a prominent symptom. Nasal obstruction persisted and increased, so that she soon became, and has since remained, a mouth-breather.

During the following months facial deformity began to develop, and has since increased. Hemorrhages, not severe, but of frequent recurrence, have marked the progress of the tumor. During September, 1903, about eighteen months after the first symptoms, the tumor presented at the left nostril, and began to protrude.

Examination.—Patient seems in a general way to be a healthy, robust country girl. The facial deformity is striking and severe. Protruding from the left nostril is a red, firm mass, one inch in diameter, disposed to bleed upon manipulation. All normal contour of the nose is destroyed, the nose being completely flattened, and the "frog face" perfectly developed.

The separation of the eyes and orbits was striking, the pupillary distance which in such a girl should have been about 58mm

was 88mm. Thus the pupillary distance was increased 1.2 inches. Yet there was no diplopia, or other ocular symptoms.

Just below the left lachrymal sac was an ulcer where the tumor had begun to break through the face. The hard palate on the left side was slightly depressed, and the rhinoscope showed a red mass protruding backward into the naso-pharynx.

Ear symptoms had not been noticed, but the watch was heard at only four inches with either ear. Cerebral symptoms were not, and had never been, present.

A diagnosis of nasal fibroid was made, and an operation agreed upon.

Operation.—The operation was made at the Nashville City Hospital, in the presence of my class. A preliminary tracheotomy was done, through which the ether was administered. The pharynx was next tamponed as a protection against hemorrhage in the rear. An incision was begun below the right inner canthus, carried transversely across the root of the nose to a point below the left inner canthus, thence vertically downward to a point on a level with the nostril, thence to the right into the left nostril. The soft parts being divided, it was found that no bone instruments were needed, as the nasal bones had already separated widely, both from the frontal above, and from the superior maxillary laterally. The above flap being turned to the right, the tumor was brought well into view. It presented as a firm fibrous mass, of a pale pink color, and occupied the space of the nasal fossæ, the antrum of Highmore, and much additional space which it had arrogated to itself.

It was found expedient to remove it in two parts, a wire snare being thrown around the growth about its middle as a protection against hemorrhage, and the anterior half removed by an incision which, in the middle of the tumor, showed a large deposit of calcareous material.

The posterior half was then enucleated by the finger inserted around and behind it.

The pedicle was found to be attached both to the septum and to the roof, corresponding to the upper edge of the vomer and under surface of the body of the sphenoid. This pedicle was cellular rather than fibrous in character, and when torn bled less than might have been expected; in fact, the hemorrhage was only trivial. The pedicle was two inches horizontally and one inch vertically.



FIG. 1.



FIG. 2.

To illustrate Dr. Wood's case of Nasal Fibroid.

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FIG. 1.



FIG. 2.

To illustrate Dr. Wood's case of Nasal Fibroid.

The cavity left by the removal of the growth corresponded in general size and shape to the inside of an ordinary glass tumbler. The septum was, of course, displaced and atrophied by pressure. The outer bony wall of the left nasal fossa, including the inferior turbinal, the lateral mass of the ethmoid and its turbinals, and the inner bony wall of the antrum, had disappeared, there being only a thin shell of bone under the cheek, the concavity of which was filled up by the tumor.

The cavity was packed with gauze and the wound sutured. The operation lasted an hour; the patient had shown marked symptoms of shock, and had been given a pint of normal salt solution into the thigh.

The reaction following the operation was tardy and ineffectual; enteroclysis and hypodermoclysis were several times repeated also strychnine, atropine, and hot-water bottles were used, but the patient continued to sink, and died from surgical shock twenty-two hours after the operation.

The following is the microscopical report by Dr. R. L. Jones, Pathologist to the Hospital:

"The mass is irregularly pyramidal in shape, slightly flattened from side to side, presenting three-surfaces and three angles or extremities, the longest of which projected from the nostril, its tip being gangrenous.

"*Size*.—Length, 10cm; width at widest part, 6.25cm; thickness, 5cm; point of attachment oval in shape, 5 × 2.5cm; weight, 162 grammes. Has thin capsule, which strips with difficulty; is firm, white, and hard, and cuts gritty, as if it contains bone or calcareous matter.

"*Microscopical Appearance*.—The specimen consists of a network of fibrous connective tissue, with mucous tissue between; blood-vessels numerous; capsule covered with mucous membrane.

"It is probable that the growth began as a mucous polyp, and that the fibrous-tissue growth was secondary, and that the calcareous infiltration occurred later."

REPORT OF A FATAL CASE OF CHRONIC SUPPURATIVE OTITIS WITH CHOLESTEATOMA IN THE DRUM CAVITY AND ANTRUM, CELLULITIS OF ALMOST THE ENTIRE SCALP, THROMBOSIS OF THE TRANSVERSE SINUS, CEREBRAL ABSCESS AND SOFTENING OF THE CEREBELLUM.¹

By JOHN GUTTMAN, M.D., NEW YORK.

I THINK that an additional case of so grave a nature and of such complications as the title indicates is of sufficient interest to be reported before this Society.

History.—J. W., twenty years old, was suffering for the last eight years from a purulent discharge from his right ear. At the beginning of December, 1903, he began to complain of headache, but was still able to attend to his work until the last week in December, when his headache became so severe that he went to bed, and called his family physician, who prescribed some powders. Four days later some swelling appeared behind his right ear, and I was called in consultation on January 3, 1904.

I found the patient, a fairly robust young man, of good family history, lying in bed complaining of intense headache, but otherwise in fairly good spirits. Temp. 101° F., pulse 84; both pupils reacted to light promptly; no stiffness of the neck. There was a slight doughy swelling behind the mastoid plane in the region where the emissary vein emerges; the mastoid immediately behind the ear was neither swollen nor reddened, and only slightly painful to pressure over the region of the antrum. Examination of the middle ear showed a large perforation of the drum mem-

¹ Read before the Otological Section of the New York Academy of Medicine, February 11, 1904.

brane, with a scanty discharge of foul odor and of cholesteatomatous character.

I advised shaving the hair over the swelling in back of the ear in order to determine whether this cellulitis was due to the affection of the ear or to a local cause. On the next day (January 4th) the patient was in the same condition, but the swelling increased towards the vertex of the head. Temperature and headache unchanged. Examination of the interior of the eyes showed right choked disc and left neuritis optica. Vision was : right, $\frac{3}{8}$; left, $\frac{3}{8}$. I immediately advised the patient to be transferred to the New York Ophthalmic and Aural Institute, where on the next day (January 5th) the cellulitis spread downward, closing the right eyelid, and even extending to the left forehead.

Operation.—The patient was put under ether and the usual incision for a radical operation through the skin to the bone was made; this was extended backward for 3" and upward over the pit of the auricle for about $2\frac{1}{2}$ "; a large amount of foul-smelling pus followed the incision of the skin. The entire scalp seemed to be denuded by the abscess, which burrowed underneath; several openings through the scalp were made for drainage. After spending considerable time in the evacuation of the pus, I examined the bone for a fistula, as I was convinced that this pus had its origin inside of the temporal bone. Being unable to find any fistula, I chiselled the bone at the antrum, which contained a slight amount of pus and a good deal of soft, brittle cholesteatous masses; I then chiselled away the posterior wall of the ear canal connecting the two cavities, but I did not consider it wise to do the plastic portion of the operation, as I thought that further intervention might become necessary. In exposing the attic I encountered cholesteatous masses, and after evacuating and clearing these away, I explored carefully the antrum with a thin probe.

In the posterior wall of the antrum, the probe slipped into a fistula leading backwards, and widening this fistula I exposed for $1\frac{1}{2}$ " a soft white tissue which was pulsating, and I was in doubt whether this was *dura cerebelli* or a softened thrombus of the sinus. As the condition of the patient became very poor at this stage, I thought it best to discontinue the operation for the time being.

On the next day (January 6th), the pyæmic character of the

temperature became more evident; it rose to 105° at 12 P.M., and was 99° at 9 A.M., pulse 84. The swelling of the lids on the right side diminished considerably, but the left eye became closed by œdematous swelling of the lids. The pain in the head was but slightly diminished.

As the temperature and general condition did not improve on the following day (January 7th), the patient was again anæsthetized and the *lateral sinus was laid bare backward almost to the torcular, and downward nearly to the jugular bulb*, by taking away the tip of the mastoid. The parietal wall of the sinus was partly sloughed away, and the rest of it was slit open with a pair of scissors; the sinus contained a grayish, brittle, purulent mass, the result of purulent liquefaction of a septic thrombus. As much of this mass as possible was carefully removed with a curette, until a stream of dark-colored blood made its appearance from the posterior portion of the sinus; this was allowed to escape for a few moments, but was finally checked by placing a gauze tampon upon the sinus. By clearing away the septic material from below, slight bleeding also occurred; this, too, having been checked by a tampon, the entire wound was packed with gauze, and the patient put to bed.

On January 8th, the pyæmic temperature (105° at night and 99° in the morning) continued; there was still pain in the head; the œdema of the left cheek had gone down considerably; on removing the dressing, considerable pus gushed out from the wounds in the scalp.

On January 9th, the maximum temperature was only 103° F., pulse 78, the swelling of the face and scalp diminished. Redressed.

On January 10th, the temperature rose to 107° , pulse 84; painful diarrhœa, several rigors, fetid breath, putrid expectoration, and pain in the back appeared. These symptoms pointed evidently to a septic infarction of the lungs and thrombosis of the intestinal blood-vessels. The jugular region was somewhat painful, but there was no cordlike swelling; emphysematous crepitus was felt in the jugular region near the hyoid bone. I now decided to ligate the jugular vein. The patient was again put under ether, and an incision from the angle of the lower jaw along the anterior border of the sterno-cleido-mastoid was made. Several inflamed lymph nodes were encountered and removed. The internal jugular was exposed in the lower carotid triangle; it

was followed upward and ligated where it is crossed by the omohyoid; the facial vein was also ligated. The wound was then dressed and the patient put to bed.

On the following day (January 11th), the temperature reached only to 102°, pulse 78; the diarrhœa ceased, and there was no rigor; the wound was again dressed.

On January 12th, the temperature rose again to 105°, and the pulse rate was only 60. Dr. Knapp, who saw the case with me and was kind enough to assist me in all the operations, was of the opinion that besides all the other complications I probably also had to deal with a brain abscess. Not being strongly convinced of this, I thought it best to postpone further interference until the next day.

On January 13th, the temperature and pulse were unchanged, the patient became stuporous and somnolent. The wound was extended upward, and chiselling out a piece of bone over the temporal ridge, the middle cranial cavity was entered, and a small knife was repeatedly introduced deep into the temporal lobe of the brain; liberating more than two ounces of thick, foul-smelling pus. The bone beneath the sinus was then chiselled through and the cerebellar fossa was entered. The introduction of the knife into the cerebellum brought forward only softened brain tissue. Both cavities were packed with iodoform gauze, and while still on the operating table the pulse rose from 60 to 136. Twenty-four hours later the patient died with symptoms of coma and œdema of the lungs.

No autopsy was permitted.

From the history of the case, it is evident that the patient was suffering from a septic thrombo-phlebitis and an abscess of the cerebrum and cerebellum, complicated by a cellulitis of the scalp, all of which originated from a chronic suppuration of the middle ear and cholesteatoma of the antrum and attic. At the first examination of the patient I suspected intracranial complication, but was unable to ascertain whether I had to deal with an epidural abscess, a thrombosis of the sinus, or brain abscess, or a combination of these affections. The symptoms, which I intend to comment upon critically, did not warrant a more definite diagnosis at that time.

The most important and most pathognomonic symptom in

these cases is undoubtedly the pyæmic fever. This symptom alone does not with absolute certainty indicate thrombo-phlebitis, because we may have this same characteristic pyæmic fever, even combined with metastases, occur in osteo-phlebitis pyæmia without sinus phlebitis. Osteo-phlebitis pyæmia is produced by the introduction of septic material into the circulation through the small diploic veins in the temporal bone (1).¹ These cases may recover without any operation on the sinus. In a case of Bezold mastoiditis operated on by me seven years ago (2), pyæmic fever set in, and a metastatic abscess in the form of a deep phlegmon of the palm developed. After some internal medication, and opening of the metastatic abscess, the patient recovered without interference with the sinus.

Schultze (3) reports three cases of osteo-phlebitis from Schwartz's clinic where no surgical operation was performed; in one case a slight operation, such as the paracentesis of the drum membrane, or the opening of the mastoid, aborted the pyæmic fever. Körner (4), Grunert and Zeroni (5), Rimini (6), and others report similar cases of osteo-phlebitic pyæmia that recovered without operation. Therefore pyæmic fever, even when it is accompanied by metastases, can not be looked upon as an absolute diagnostic symptom of sinus phlebitis; in our case, the fever might also have been accounted for by the complicating cellulitis of the scalp.

The next important symptom in the case was the choked disc in the right and the optic neuritis in the left eye. Opinions differ greatly about the pathognomonic feature of this symptom for sinus thrombosis or brain abscess. Zaufal's (7) statement, that the absence of papillitis of the optic nerve is a contra-indication to laying bare the lateral sinus, is positively antiquated. The other extreme opinion of Kipp (8) who says that he has never seen neuritis optica in a pure phlebo-thrombosis can not stand in the light of our present experience.

Jansen (9) found the following relation between changes in the interior of the eye and otitic intracranial complications:

¹ See references at the end of this article.

	Negative.	Hyperæmia of nerve.	Neuritis optica.	Choked disc.
In thrombosis.....(23)	11	2	4	6
" arachnitis..... (9)	2	1	2	4
" brain abscess..... (8)	2	1	2	3
" brain abscess and arachnitis } (3)		1	1	1

Jansen (10) found in 92 cases these relations as follows :

In 52 cases (53.6 %), normal ; in 45 cases (46.4 %), there were changes in the interior of the eye ; in 19 cases (19 %), slight papillary changes ; in 23 cases (23.7 %), neuritis optica ; in 3 cases (3.1 %), choked disc. He found changes in the interior in extradural abscess in 18 %, in meningitis serosa in 87.5 %, in cerebral abscess in 29 %, in uncomplicated sinus thrombosis in 44 %, and in complicated sinus thrombosis in 47 %.

On the other hand, there are cases where papillitis nervi optici occurred in an ordinary middle-ear suppuration without any intracranial affection, as was seen by Knapp (11), Fulton (12), and others.

The extensive cellulitis of the entire scalp extending to the eyelids and face was certainly a remarkable feature in the case, and at the same time a rather disagreeable complication. This not only made the diagnosis more doubtful, but also interfered with the treatment, inasmuch as the constant oozing of pus from the abscess above rendered the region of the sinus far from being aseptic. The cellulitis, probably, was only an extension of the small œdematous swelling, which appeared in the posterior part of the mastoid, in the region where the emissary vein emerges. This is called the Griesinger symptom. We have also seen that there was absolutely no swelling or redness in the anterior part of the region of the mastoid, and that the pain on pressure was very slight. It is therefore erroneous to look upon swelling, redness, or even pain on pressure over the mastoid as a criterion of an affection of the antrum and especially of its neighboring regions.

The so-called Griesinger symptom, together with the lack

of swelling in the anterior part of the mastoid, I consider a valuable sign of an intracranial complication, but whether this is always caused by a sinus phlebitis is rather doubtful. In a case of epidural abscess (13) which I operated on two years ago, and where the patient recovered without any interference with the sinus, as its involvement was doubtful, the anterior part of the mastoid was also found normal and the Griesinger symptom alone pointed to an affection of the antrum with intracranial complication.

So extensive a cellulitis complicating septic sinus thrombosis as in our case I found only in a case described by Dunn (14). Pouchelt (15), Stockes (16), Green (17), Wendt (18), Heubner (19), and others consider the erysipelatous swelling of the face, especially of the lids, diagnostic of sinus thrombosis.

The putrid sputum, fetid breath, pain in the back, and the diarrhoea pointed to metastases in the lungs and abdominal cavity. Although metastases occur also in osteophlebitic pyæmia without sinus phlebitis, and in spite of the fact that Körner (20) states that metastases in the lungs are comparatively rare in this affection, still this symptom can not be looked upon as pathognomonic of sinus thrombosis. On the other hand, inasmuch as this symptom develops, as a rule, in the last stages of the disease, its value as an aid in diagnosis must be considered problematic.

The headache is quite an important symptom, but not much stress must be laid on it, as it is only a subjective symptom, and very often some patient in order to arouse sympathy might exaggerate its intensity; and then again it is not pathognomonic for any singular otitic complication, as it may occur in all intracranial affections. Its absence again would not be of very great significance.

The slow pulse which made its appearance toward the end of the disease was a rather strong indication of the necessity to explore the brain. The rise of the pulse rate from 60 to 136, right after the evacuation of the abscess, was a very notable feature. In fact, the slow pulse was the only symptom which clearly indicated to me the presence of an abscess of the cerebrum or cerebellum; all the other symptoms—

the fever, the choked disc, headache, etc.— could also have been brought on by the brain abscess, although the entire picture could easier have been explained by sinus thrombosis.

Brain abscess, in general, unless there are local symptoms such as aphasia, ataxia, etc., is very difficult to diagnose, and the diagnosis becomes so much more difficult, or almost impossible, if the brain abscess is complicated, as in our case, with sinus phlebitis overshadowing the symptoms of the brain abscess.

In a similar case, where the temperature and pulse ratio would be so disturbed, I would not wait so long to explore the brain. Dr. Knapp was of the opinion that the original and main affection was the brain abscess, and that the sinus thrombosis was only an indirect secondary affection produced by the brain abscess. I held the sinus thrombosis as the main and primary affection, as there was a directly communicating fistula leading from the antrum to the sinus, and all of the symptoms, with the exception of the slow pulse near the end, pointed to sinus thrombosis. I considered the cerebellar abscess as formed directly by continuity from the sinus, and the cerebral abscess by the propagation of septic material through the diseased tegmen.

Let us now consider the treatment of these affections. A conservative expectant plan is hardly justified in cases where suppuration is progressing in such dangerous regions of the human body. It is true, that there are cases reported belonging to this class of affections where an expectant procedure without surgical interference with the sinus led to recovery. Schultze (3) reports three cases of otogenous pyæmia in Schwartz's clinic, where there was quite strong suspicion of an affection of the lateral sinus and the patients recovered without operation on the sinus. In one of the cases the reason that the sinus was not laid bare was that the prognosis was very bad right at the beginning, and still the patient recovered without operation. In another case mere paracentesis of the drum membrane aborted the pyæmic symptoms and the patient recovered. Still, at the present time, the vast majority of otologists consider surgical interference imperative in such cases; they simply differ as

regards the time of action. Grunert (21) says: "The prognosis of sinus thrombosis is so much more favorable, the sooner the case is operated upon."

Holscher (22) is of opinion that there should be no time wasted in waiting.

Schenke (23), who reported nine cases operated on for sinus thrombosis, says: "We do not deny the possibility that some of our cases might have recovered without operating on the sinus, or even without opening the mastoid, still we operated as soon as we thought that the diagnosis warranted it, because we do not care to take the responsibility of endangering the patient's life by metastases or septicæmia by an expectant management."

Körner (20) is somewhat more conservative. He says: "The mode and extent of our surgical interference must always be adapted to existing conditions."

There is much difference of opinion as to the mode of operation, as well as about the question whether the jugular should be ligated or not. Körner (20) believes that the jugular is to be ligated only when there are positive signs of its affection or when there is pyæmic or septic fever. He is not in favor of an exploratory incision of the sinus wall for diagnostic purposes except perhaps by Whiting's method.

Grunert (21) again advocates ligature of the jugular, as this not only cuts off the road by which metastases form, but it is also a preventive against any dangers which might follow an exploratory incision of the sinus wall.

I was prompted to ligate the jugular in my case, because there was unmistakable evidence that septic material was carried by the jugular vein into the circulation.

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REPORT OF A FATAL CASE OF MULTIPLE
OTITIC ABSCESES IN THE TEMPORAL
LOBE, WITH REMARKS.¹

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(With Text-Plates I., II., III., and IV. at end of the article.)

THE literature of otitic brain abscess has increased so much of late that it might seem superfluous to make any contributions on this subject. The following case, however, presents some pathological features which invite discussion and which are, perhaps, of sufficient importance to justify publication.

History.—Mr. R. B., thirty-nine years old, was admitted to the New York Ophthalmic and Aural Institute, Nov. 8, 1903.

In his early childhood he had an infectious disease, probably scarlet fever. Since that time he has had a purulent discharge from his left ear. Some years ago he suffered from typhoid-malaria, and he has had recurrent attacks of malaria nearly every year. Besides he had some chronic intestinal trouble and constipation which were attributed to a "floating kidney." With these exceptions he had been in good health and able to pursue his work as a lithographer regularly. His otorrhœa had always been slight and never caused him any uneasiness. Patient considered himself in very good physical condition when his present illness began.

About the middle of September, 1903, he first complained about some pain in the left ear and a dull headache on the same side. A doctor prescribed for him but gave him no relief. On the 27th of September he consulted Dr. W. T. Kudlich in Hoboken,

¹ Read at the meeting of the Section of Otology of the New York Academy of Medicine, February 11, 1904.

to whom I am indebted for the following notes: Dr. K. examined the patient's ear and found foetid pus in the external canal and granulation tissue in the tympanum. The usual irrigations and applications were ordered. At that time temperature and pulse were normal and no suspicion of any serious illness was aroused. Patient reported at the doctor's office once a week. He seemed to have some relief at first, but his earache returned, his headache became more continuous, and his sleep was not restful. He kept on working but was rather fatigued, sometimes excessively so, when he came home in the evening. On Oct. 31st a moderate rise of temperature was first recorded. Gradually the feeling of sickness and prostration became more marked and the pallid appearance of his face was noticed. About a week before his admission patient had a spell of dizziness, which has recurred quite frequently since. He had evening temperatures to 99° – 100° ; no distinct rigors were observed.

The pain in the ear became so severe that narcotics had to be given and patient was kept in bed. He seemed rather apathetic at times, but this was ascribed to the effect of morphine and other drugs. On Nov. 4th Dr. R. O. Born, New York, was called in consultation.

He concurred in the diagnosis, "chronic otorrhœa with acute retention," and removed some of the granulation tissue to relieve the retention. Apart from a slight drowsiness, there were no symptoms of an intracranial complication; the eyes were carefully examined and the fundi found normal. A few days later, Dr. Born saw the patient again and found his condition unchanged. He advised a "radical operation," which I was called upon to perform.

On Nov. 7th patient was transferred from his home in Hoboken to the New York Ophthalmic and Aural Institute. When he arrived there in the evening he was so tired and dizzy that he had to be carried up-stairs. He was put to bed and soon fell asleep.

State on Admission.—When I saw him for the first time late the same night he was resting comfortably. He complained of very little pain in the ear, seemed mentally bright, and answered all questions promptly and intelligently. He left his bed unassisted, and walked over to a chair without showing any signs of prostration or dizziness. Right ear was sound and of normal hearing. Left ear was discharging very little creamy, faintly foetid pus;

there was a large perforation in the *Mt*, the upper part of which was hidden by a mass of very dense granulation tissue. A slight sagging of the adjoining upper and posterior wall was noted. The withdrawal of a probe passed into the attic was followed by a minute quantity of pus. There was no mastoid tenderness, no tenderness on percussion of temporal or occipital bones. No eye symptoms; no motor-paresis. Temperature 100.2°; pulse 88, regular, not very full.

It was considered safe to keep the patient under observation for another day. No opiates were given, but the night was passed very quietly. Patient did not feel rested in the morning and had a rather drowsy look. The pallor of his face was more noticeable; his tongue was coated. Temperature 98.2°. Pulse about 80—at times slightly irregular. Examination for ophthalmic and for motor or sensory parietic symptoms was negative. Patient's memory was good, and the search for aphasic symptoms was quite amusing to him. He was glad that he "was not that far gone." The reflexes were normal.

His gait was steady; he could toe a line; he stood up steady with closed eyes, but became dizzy when he turned quickly, especially toward the left side. Then a slight nystagmus was noticed.

During the day patient was very quiet, spoke and complained little, dozed quite a good deal, but was easily roused, and his mind never seemed obscured. He slept during the night, had a little more pain and headache in the morning, but seemed quite bright, and looked cheerfully forward to the operation.

No new symptoms developed.

Our first suspicion of an existing intradural complication remained a mere suspicion, and our diagnosis was: Retention of pus in attic or antrum, pressing against the dura; fistula in semicircular canal.

Operation (Nov. 9th).—The *radical operation* was done in the usual way after Zaufal. The mastoid bone was found sclerosed and extremely hard, and the concussive effect on the brain must have been considerable. As soon as the attic was opened, pus welled out under pressure. About two drams escaped. Attic and antrum were lined with discolored necrotic granulation tissue; there was a large defect in the tegmen, about 12 by 7 mm, and the surrounding bone was necrosed and partly detached. The dura was covered with the same granulation tissue which lined attic and antrum; after its removal there remained a dark

uneven surface. The dura did not pulsate and did not bulge into the enlarged opening. It appeared stiff and very much thickened; the probe did not penetrate anywhere. The extradural abscess was shut off from the tympanum proper by a dense layer of old granulation tissue which was woven around the carious remnants of hammer and incus. After all granulations had been removed, a carious erosion was seen on the prominence of the semicircular canal. The carious process did not seem to extend backward toward the sinus. We were satisfied that all the symptoms observed up to that time could be accounted for by the conditions found. The operation was completed in the usual way and the wound closed.

Subsequent Course.—Patient passed a more restless night than is usual after radical operations.

When I saw him in the morning he thought his pain in ear and head were just about the same. His drowsiness became more pronounced; although he could be easily roused he quickly lapsed back into his apathetic state. He yawned frequently. Ophthalmoscopic examination showed congested fundi but no distinct optic neuritis. Motor power, sensations, and reflexes were normal; no aphasic symptoms could be elicited. There was some difficulty in passing the urine. Temperature and pulse were about the same as before the operation. Patient slept very little the following night and was very tired and discouraged in the morning. He said he felt himself getting weaker all the time. The ash-gray color of his face was more marked; his tongue was very much coated. He took nourishment well, did not complain of any pain, but seemed rather dull of comprehension at times. Early in the afternoon I found him in a drowsy condition, curled up on his left side with his head resting on his arm. He was not so easily roused as heretofore. The right side of his face seemed to lack tonus and the naso-labial fold was less marked. The grip of his right hand was not so strong as that of the left. Dynamometer, right, 27; left, 28. When told to hold up both arms as long as he could, the right would invariably sink down first. No difference was found between the muscular power of the lower limbs. The cutaneous reflexes were normal, the knee-jerks possibly a little exaggerated. The ankle clonus was easily produced. There was some sensory aphasia; patient could not designate certain objects although he knew their import; at the same time he was able to repeat without failure words spoken

to him. Occasionally he mixed the names of objects, calling a pencil a pocket-knife, etc. The optic neuritis was more marked; the outlines of both discs were hazy. Macewen's percussion symptom could not be elicited. Temperature was slightly above normal; pulse about 80, and not of a cerebral character.

About the presence and the localization of a cerebral abscess there could be no more doubt. It was evident that the encephalitic suppuration was increasing rapidly and that immediate evacuation was imperative. The necessary preparations were made and the patient put on the operating table as soon as the required consent could be obtained. During this time (about two hours) the drowsiness increased to stupor. The slow cerebration and the aphasia became more obtrusive, the speech less articulate. The motor-paresis did not increase perceptibly.

Operation (Nov. 11th).—Under chloroform anæsthesia the wound was opened again, the incision extended upward, and a cross-incision carried backward. The opening at the base of the skull was extended outwardly into the squama, until it measured about 1 inch in length by $\frac{3}{4}$ inch in width. The incision of the dura met with some difficulty on account of its thickness (over $\frac{1}{4}$ inch) and its leather-like toughness. It was necessary to excise a large piece to gain access to the underlying brain-tissue. The latter was pale and soft, and a pulpy mass protruded into the opening. A narrow-bladed knife was then introduced into the temporal lobe about one inch deep in several directions inward, upward, forward, and backward—about three to four times, without bringing pus. A little jelly-like matter resembling pus oozed out through the incision,—it was found to be brain, tissue under the microscope. As we were sure of our diagnosis the knife was inserted again—this time in an extremely backward and upward direction. At a depth of nearly an inch, it struck the abscess and pus welled out. The incision was enlarged with a dressing forceps and nearly an ounce of thin, grayish-yellow, slightly fœtid pus was collected. The finger was introduced into the cavity; no abscess membrane could be detected. In the absence of proper flushing arrangements the cavity was not irrigated. After thorough evacuation it was loosely filled with one strip of iodoform gauze, the wound was dressed, and the patient returned to bed in good condition, with a pulse-rate of 90. Microscopical examination of the pus revealed a mixed infection of cocci and several bacilli; their identity was not determined.

Course after Operation.—Patient slept rather heavily all night and was delirious at times. It was a distinct disappointment to find him on the next morning in the same stupor, with a slightly increased motor-paresis. In the afternoon he moaned some; sighing and groaning were frequent. Pulse was distinctly full, temperature about 100°. There was some difficulty in swallowing. It was thought better to change the dressing and relieve a possible retention or irritation. The removal of the strips of gauze from within the abscess cavity was followed by a slight flow of pus—about one dram. Instead of the gauze-drain, a rubber tube was introduced. The following night was the most comfortable since the day of the first operation, and patient seemed a little brighter the next day. This slight improvement lasted for about two days, while the hemiplegia and the optic neuritis remained the same.

The wound was dressed daily; there was little discharge through the tube. A small prolapse had formed and was slowly growing.

After a more restless night patient complained of an increased headache; on the fourth day after the operation on the brain, it grew worse during the day and became so furious toward night that I decided to make another exploration (Nov. 15th). Pulse was very full. Temperature about 100°.

Patient was put on the operating table; the wound was cleaned and the opening in the dura enlarged with scissors. A scalpel was again introduced in the direction of the former abscess; at a much greater depth than before, a moderate accumulation of pus was found and a longer tube put in. While on the table patient voided urine involuntarily.

He passed a restless night, tossing about in bed. He seemed nauseated, but did not vomit; he hiccupped a great deal. He was somnolent and difficult to rouse all the next day (16th). At times he was restless and delirious, and left his bed in an unguarded moment. He took nourishment quite well.

The stupor increased on the 17th. Right facial paralysis was pronounced, patient was unable to lift his right arm and leg. Right pupil was dilated; neither pupil reacted to light. Patient had severe hiccup; passed urine involuntarily. Temp. 101°.

A *lumbar puncture* was done and about half an ounce of perfectly clear cerebro-spinal fluid withdrawn. It contained no corpuscular elements, no bacilli. The apparent effect of the

lumbar puncture was quite striking. Patient had a better night, he was more easily aroused the next morning; he recognized some relatives and made an effort to talk. He took nourishment better. The pupils showed some sluggish reaction. There was retention of urine and the catheter had to be used. The temperature remained lower than before.

Patient had another fairly good night, but was decidedly worse in the morning. While being dressed he was very irritable and petulant. He sank into a stupor soon afterward, from which he could be but partially aroused. I changed the dressing again at 10 P.M., and passed a probe in several directions into the temporal lobe without finding any pus. Another lumbar puncture was being prepared. While patient was being turned over on his right side it was noted that suddenly all resistance ceased. He had fallen into a deep coma with absolute motor-sensory paralysis. Both pupils were dilated and rigid. The lumbar puncture was given up, the drainage tube was withdrawn from the brain. There were no convulsions. Temperature went from 99° up to 103.4°. The pulse became weaker, the respiration irregular. Exitus letalis at 2 A.M. Nov. 20th.

Post-mortem Examination.—The calvarium was removed in the usual way, but the dura was not incised. The brain was taken out within the dural sac and put in a solution of formalin. Only the different sinuses related to the left temporal bone were opened and found free from disease. The opening in the dura above and laterally from the tegmen was $\frac{3}{4}$ inch in diameter, with very much thickened, dark-colored edges. The opening in the skull through tegmen and squama was over 1 inch long, and for the greater part $\frac{3}{4}$ inch wide; it reached outwardly to within $\frac{1}{4}$ inch from the groove for the meningeal artery on the inner surface of the squama. The edges were formed by healthy bone; only at the extreme inner and forward end there was still a small rim of carious bone, brittle and discolored on its dural surface; a similar piece was found posteriorly from the outer part of the antrum. From the outer and posterior corner of the antrum, a narrow carious canal led toward the sigmoid groove, ending blindly at the internal table; the latter was still intact and no discoloration was visible on its inner surface. The erosion on the prominence of the horizontal semicircular canal was shallow; no distinct macroscopical changes were visible on the membranous canal. Stapes and stapedius tendon were intact, though im-

bedded in granulation tissue. After the brain had sufficiently hardened (about six weeks later), Dr. M. Allen Starr was kind enough to dissect it. The dura was easily removed; there was no sign of leptomeningitis. On the outer and lower surface of the left temporal lobe was a small prolapse of necrosed brain tissue. The brain was opened by four coronal sections through the temporal lobes. The lateral ventricles were free, the left one being very much compressed, the right one somewhat distended. Most conspicuous in all sections was the enormous enlargement of the left hemisphere and the displacement of the median line toward the right.

The sections through the left temporal lobe¹ show the presence of four distinct abscess cavities and a disintegration of brain tissue extending beyond the border of the temporal lobe into the lenticular nucleus and into the internal capsule and farther up into the median part of the parietal lobe. The three upper abscess cavities have, as serial sections show, no direct communication with each other, but have an outlet laterally leading into the drainage opening. Otherwise they are each entirely surrounded by infiltrated brain tissue (as shown under the microscope), the lateral wall of the upper one being formed by the cortex of the first and second temporal convolutions. These cavities contain merely pus and no detritus. The fourth cavity below and posteriorly is also distinctly outlined, but communicates with the third by a very minute pathway $\frac{1}{4}$ inch long, and contains detritus intermingled with pus-cells. It seems to represent an abscess in its incipency, set up by an infection which is spreading out at a certain point after it has crept along the narrow channel of a blood-vessel or lymphatic for some distance. About the mode of formation of the other three cavities I have not been able to come to a positive conclusion. I would be inclined to think that the middle cavity represented the original abscess, and that the others formed more or less independently around a focus of advanced septic encephalitis. There is another such

¹ The four plates subjoined to this article illustrate the extensive invasion of the brain by the purulent inflammation in coronal sections, which are parallel and one-quarter of an inch apart.

septic focus in the vicinity of the lenticular nucleus which looks like an abscess in the process of formation; it would have been complete if patient had lived a few days longer.

The pathological conditions, together with the clinical observations, make it probable that the progressive encephalitis started immediately after the mastoid operation. The latter, possibly, was a causative factor in the rapid expansion of the septic process. It has been the generally adopted procedure in cases of suspected intracranial complications to explore the middle ear and its accessory cavities first, and to stop at the dura wherever the conditions found fairly account for the clinical symptoms. But the wisdom of this practice seems doubtful in cases where a suspicion of brain abscess exists. It would seem wiser to keep the patient under close observation until a diagnosis is possible, and then to relieve the retention in ear and cerebrum in one sitting; or, should the retention in the middle ear require immediate attention, it might be relieved in many cases by a simple and gentle operation like ossicectomy.

In regard to the method employed for reaching and draining the abscess, the way through the very large opening at the base of the skull seemed to present itself as the natural route. Unfortunately the abscess was not situated directly above the tegmen; it seemed as distant from the tegmen as it would have been from the squama, and the much-praised advantage of the mastoid route was lost. Later, when complications arose, a counter-opening through the squama was considered, but given up as futile. The sudden collapse of the patient into the deepest coma was explained by the discovery of an extensive hemorrhage into pons and fourth ventricle. The whole aqueduct was distended, the ventricle filled with blood. Numerous minute hemorrhages were scattered throughout the pons.

In the literature I have found only two somewhat similar occurrences mentioned in cases of cerebral abscess. In a case reported by Röpke (ARCH. OF OTOL., 1901, p. 27), the corpus striatum was "full of minute hemorrhages without any other changes in the vicinity." Preysing (*ibid.*, p. 33)

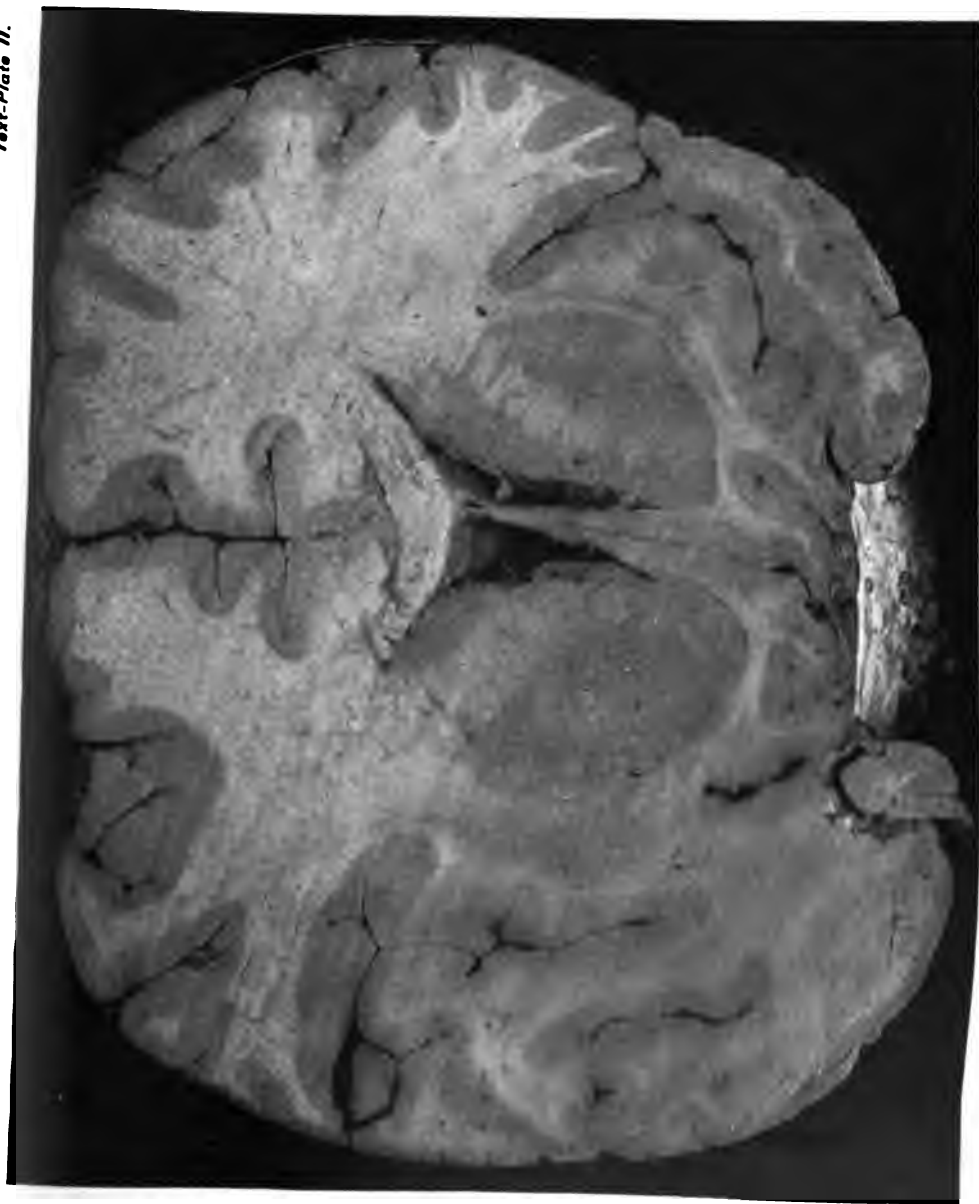


FIGURE II (section through the anterior part of the temporal lobes just in front of the auricle) shows the enlargement of the invaded hemisphere and the compression of the other, the infiltration of the temporal lobes, and the compression of the cortex.

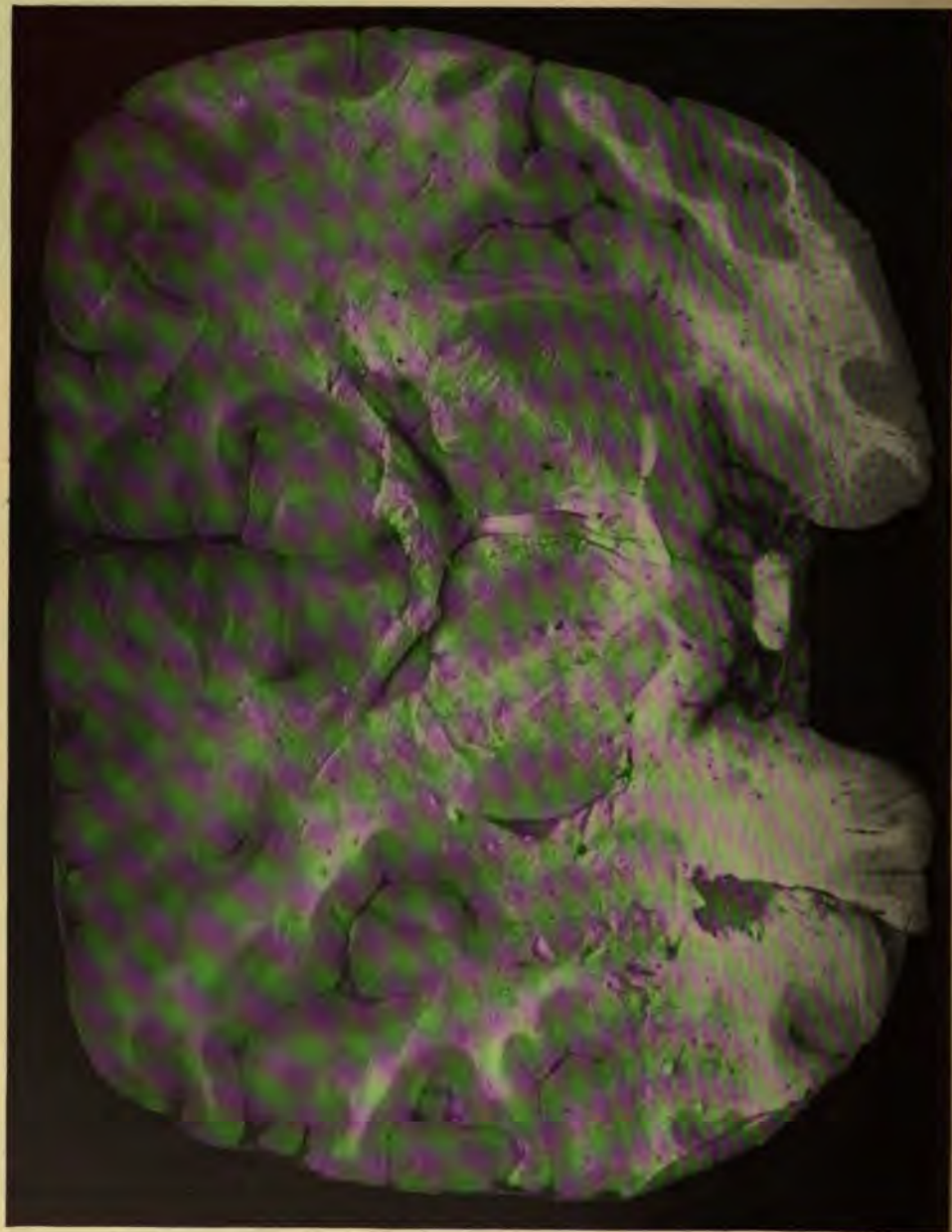


FIGURE 11.—Beginning disintegration of the temporal lobe, extending into the thalamencephalon and parietal lobe. The out-

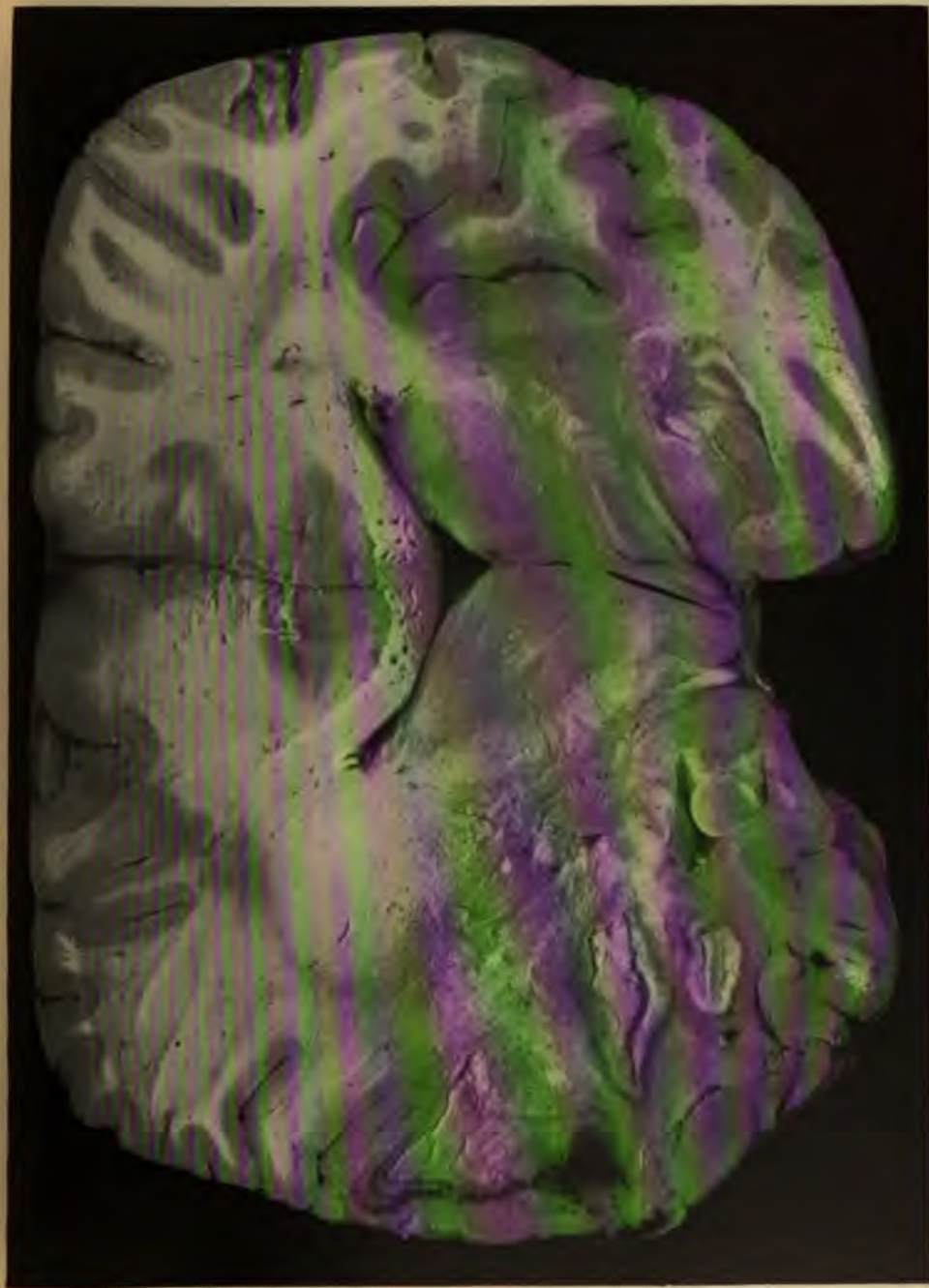


FIGURE IV shows the three upper abscess cavities and the complete disintegration of the surrounding tissue, including the lenticular nucleus and the internal capsule.



FIGURE V.—A fourth ventricle cavity is seen in the lowest part of the temporal lobe. The left lateral ventricle was not invaded, but compressed, the right somewhat distended.

found a hemorrhagic area, 12 by 2 by 4mm, in the crus cerebri. Both were cases of a diffuse abscess; the cause of the hemorrhages is not commented upon. In a case of cerebellar abscess reported by Dr. E. B. Dench (*Transact. Amer. Otol. Soc.*, 1903), a hemorrhage occurred into the spinal canal. These hemorrhages cannot be mere coincidents, but must be due in some way to the suppuration in the brain. The only explanation I can suggest is that the septic or toxic matter may affect and weaken the walls of blood-vessels through which it is carried away. The possibility of such a hemorrhage would be another important reason why patients with encephalitis should be handled with the utmost gentleness.

THE EAR OF THE SPERM WHALE AND SOUND CONDUCTION.

BY DR. GEORGE BOENNINGHAUS, Breslau.

Translated by Dr. W. S. BRYANT, New York.

AN essay by me will appear in one of the next volumes of the *Fahrbücher der Zoologie*, on "The Ear of the Sperm Whale, a Contribution to the Theory of Sound Conduction." This paper is a continuation of one on the "Pharynx of the *Phocæna Communis*," which has already appeared in vol. 17 of the *Fahrbücher*.

I have attempted to explain the remarkable changes which the whale, originally a terrestrial animal, had undergone to adapt it to marine life. This paper contains many anatomical and physiological details which, so far as the ear is concerned, I discussed at the Tenth German Otological Congress, at Breslau. The facts of special interest to the otologist, namely, the physiological conclusions which we are able to deduce from the anatomical structure of the sound-conducting apparatus of terrestrial animals, but more especially of the whale, were only briefly commented on at that time, partly because of the short time allowed, and partly because the investigations were not sufficiently advanced.

I wish to make a short resumé of all the points concerning sound conduction, because the journal in which this paper appears is not accessible to many otologists who are interested in this chapter of physiology. I will preface my remarks by saying that the anatomical findings alluded to were mostly gotten from the *Phocæna communis*, a small

whale, only two metres long, which is a denizen of the North and Baltic Seas, and therefore easily obtained.

We are to-day more than ever undecided as to the way in which sound conduction reaches Corti's organ, in spite of a great amount of laborious anatomical and physiological investigations on the normal and pathological human and mammalian ear. Comparative anatomy has been less consulted, yet it is just the field in which Nature provides the greatest help in questions of sound conduction if the findings can be correctly interpreted.

I.

Of the many subjects which would seem to be of value for study, there is none more fruitful than the ear of the marine mammals in general, and particularly that of the whale, which is the most specialized of the aquatic mammals.

The whale, in all probability, at one time had an external ear, as the seal now has; that is to say, an auricle in the form of a tube rolled up and completely drawn under the skin, where it lies parallel to the surface, and during the submerged existence it is simply shut off, water-tight, but on rising to the surface the ear is opened by muscular action for the reception of air sound waves. As the whale remained permanently in the water, his body adapted itself to hydrostatic conditions in such a manner that, even when floating on water, the external ear remained below the water line, and the whale had no further occasion to open his auricle. The musculature and the cartilaginous framework of the external ear became rudimentary, the external ear obliterated, and the part of the auditory canal near the drum membrane became filled with desquamated epithelium. In this way, the drum membrane and ossicles lost the faculty of being set in motion by sound waves, and the ossicles became ankylosed by synchondrosis with one another and with the oval window, in the same way as any joint will ankylose which has been artificially immobilized. In this case, the other motive power of the ossicles, namely, the contraction of the tympanic muscles, was not sufficient to check this ankylosis.

These retrograde changes are unimportant and are common to all organs bereft of their normal function, and we might have been led to believe that these changes are the only ones that would be encountered in the whale's ear, because there was no further need of alteration in the ear for hearing under water. We know that when we have our ears under water, all those sounds can be easily heard which originate in the water, and upon the hearing of which by the whale Nature has laid special stress, as conduction of sound waves in water to the labyrinth is extremely good. In reality, however, the conditions are very much more complicated, for we find a series of striking changes in the whale's ear, whose functions must be to conduct sound to the labyrinth in a very definite way. The purpose of these changes is evidently to improve hearing. The following points must be considered:

1. A provision is made that the sound waves of water shall not be conducted to the labyrinth from all sides, otherwise this would have the effect of weakening the sound through interference, and so impair the hearing. This is accomplished: (*a*) by acoustic isolation of the labyrinth; the bony labyrinth is separated from the rest of the cranial bones, not by diploic material, which does not occur in the whale's skull, but by air cavities connected with the tympanum; (*b*) by preventing any possible resonance of the column of air included in the tympanum, which, according to J. Müller (Müller's submerged fish-bladder experiment), would occur very easily, and which would also, on account of the interference in the labyrinth, prevent acute hearing. Dampening the resonance is accomplished by the presence of a large soft structure in the tympanum, which originated by hyperplasia of the tissues surrounding the internal carotid artery. We may here remark that in the whale the carotid passes through the tympanic cavity in an obliterated condition.

2. A special way is provided to conduct the sound waves of the water to the oval window. This is accomplished: (*a*) by a considerable thickening and increased density of the ankylosed ossicles, a fact which is specially noteworthy,

because it seems to be in opposition to the principle of a general diminution of the bony system of the whale to lessen his specific gravity; (*b*), by the formation of a peculiar funnel-shaped bony depression on the surface of the bulla, to the apex of which the thickened and very dense processus folianus of the hammer is attached. This funnel, like a hearing-trumpet, serves to collect the sound waves in the water, and conducts them along the ossicular chain to the oval window; it apparently is a functional substitute for the lost auricle.

The whale's ear shows with singular distinctness that the oval window is predestined for the entrance of sound waves into the labyrinth. Furthermore, the whale demonstrates how sound conduction passes from the oval window (the stapelial foot-plate) to Corti's organ. When the sound wave in the whale reaches the foot-plate of the stapes, it can reach Corti's organ in two ways: the first is that the waves pass from the stapes laterally through the bony labyrinth capsule, which on account of the ankylosis of the stapes is more important in the whale than in terrestrial mammals. We cannot, however, consider this as the chief way for sound conduction, but as a sort of additional pathway of less importance, but by no means insignificant. According to Savart's experiments on plates which touch at an angle, the molecules of the labyrinth capsule would have to vibrate in the same direction as the stapes and the rest of the ossicles—that is to say, in a frontal direction. As the axis of the cochlea in the whale does not lie horizontal, as in man, but vertical, the sound waves passing through the labyrinth in a transverse plane would strike the basilar fibres partly at right angles with good result, and partly longitudinally with poor result, which, together, would cause an uneven excitation of Corti's organ, which seems very unlikely. Not less important is the observation that the bony labyrinth capsule is connected with the bulla by bony union at its extreme lateral edge. The sound waves which fall laterally on the bulla and labyrinth capsule will at once pass through the labyrinth capsule in the direction which we have just shown to be unfavorable. If these sound waves were

intended for normal excitation of Corti's organ, the improvement of sound conduction to the oval window, by the contrivance of the sound funnel of the bulla and the thickening and sclerosing of the ossicular chain, would be entirely superfluous, and the whole mechanism would be inexplicable.

The chief path for sound conduction in the whale remains from the foot-plate of the stapes directly into the vestibular fluid, as in land mammals. This seems to be the more probable way, because the vestibule is situated in a direct prolongation of the stapes, and would, on this account, receive the main impact of the sound waves. Naturally, in view of the fact of the ankylosis of the stapes, and on account of the complete filling up of the niche of the round window of the whale by tissue, the vibrations of the basilar membrane can only be excited by molecular movement. It seems to me to be most necessary to accentuate this, because we meet an opinion here and there that vibration of the basilar membrane is impossible in a completely closed labyrinth, a view which Kayser had disproved by experiments with his water telephone.

We have still to consider how sound conduction takes place in the labyrinthine fluid of the whale. The vestibule of the whale has also undergone a remarkable change. It is no longer ampulliform, as in other mammals, but tubular, about as wide as the scala vestibuli, of which it can be considered a distinct prolongation. It is bent, like the cochlea, only in an opposite direction, and is in such a position that the vestibule makes about one turn, while the cochlea makes about one and a half. The oval window constitutes the beginning of the vestibular tube and is closed by the immovable foot-plate of the stapes. The propagation of sound in the vestibular and cochlear tubes must necessarily be the same as in a speaking-tube filled with water, and doubly bent in reverse spirals. We cannot say with certainty, whether reflection is as favorable in a speaking-tube thus filled with water as in one filled with air, because several physical conditions are wanting. It is, however, probable that the conditions for sound conduction are favorable, and it is certain that they become more favorable the denser the

walls of the sound-tube are. I am inclined to consider the improvement of reflection, not only in whales, but also in other animals, as the reason for the density of the labyrinth capsule in general. The reason for the transformation of the vestibule in the whale must be left for later.

It is natural to ask why Nature has made such great efforts to adapt the ear of the whale for life under water. Remembering that the sperm whale has entirely lost the sense of smell, that feeling and taste are but little developed, we will be able to value the significance of hearing for the whale as a means for orientation. The whale also has an eye just as perfectly adapted to aquatic life. What is there for the whale to hear under water? First of all, there are sounds emanating from himself, the sound of blowing, which is characteristic for each variety of whale, and which is conducted to the water by the vibrations of the air passages. Other sounds are the thrashings of his tail, which are like the motions of a propeller; and finally his voice, such as it is in the whale. By the sounds the whales are able to collect and keep together with the aid of their ears. The ear also warns the whale of dangers, especially of the common enemy, the narwhal, which betrays its proximity by sounds. The coast line, the special enemy of large whales, would make itself noticeable to the ear by the booming of the surf.

II.

The whale demonstrates the following principles of sound conduction with unmistakable clearness.

First, the conduction of sound to the labyrinth takes place through the ossicular chain; *second*, the sound conduction in the labyrinth takes place through the labyrinthine fluid and by its molecular movement. Our further observations are intended to prove that there is no reason to assume that sound conduction in mammals and man takes place according to any other fundamental principles. Sound waves of air, just as those of water, can reach the labyrinth from every part of the surface of our heads. "The bones conduct the air, the membranes conduct, the ossicles conduct, everything

does what it cannot avoid" (J. Müller). It is only a question which way is the best for sound conduction, and to this way we will ascribe the selection of the principal sound conduction. The other ways we will consider are unavoidable but of less importance.

If we stop our ears, our hearing is much impaired, which proves that the external auditory canal is the main road for sound conduction. We do not, however, find in terrestrial mammals and man such attempts to close all the other ways for sound conduction as we see in the whale. This is easily explained, because the necessity of lessening interference of sounds is not as necessary for terrestrial as for aquatic life, and because the transmission of the sound waves of the air through the cranial bones is much more difficult. All the air spaces which surround the labyrinth, the tympanum, the mastoid, and other air cells serve, as in the whale, for acoustic insulating contrivances. Another acoustic insulator is the dense labyrinth capsule, which, although it aids the propagation of sound waves which have reached it, nevertheless checks their direct reception. Another reason for the density of this bone is the elimination of interference. The irregular structure of the tympanum acts as a check to the resonance of the air in the tympanum, otherwise stalactitic projections and septa act in this manner.

There are three possible roads for sound conduction from the auditory canal and drum membrane: 1st, the conduction through the tympanum and promontory; 2d, through the round window; and 3d, through the ossicular chain and the oval window. Formerly the last way was considered the special road for sound conduction; now, however, the other two ways have also been so regarded (Zimmermann, Secchi). Irrespective of the whale's ear, comparative anatomy demonstrates that only in the minority of terrestrial mammals does the promontory and round window lie in such a favorable relation to the external auditory canal as in man, upon whose ear these opinions are founded. Among these animals, with an unfavorable arrangement of parts, we find some possessed of the most acute hearing, namely, the predatory animals.

Taking all in all, there remains for us, by exclusion, only the way through the ossicular chain and oval window as the special sound-conducting path, which naturally does not exclude the fact that the ossicles, besides their ability to transmit sound, have other functions on account of their connection with muscles, namely, the power to regulate sound, which is still under discussion. According to von Helmholtz's careful computation, we must ascribe to the drum membrane and ossicular chain, judging from their construction, the ability to transmit with great energy even faint sound waves to the labyrinthine fluid by mass vibrations, which is a very difficult task. On account of the delicacy of the movements and our incomplete apparatus, it has been impossible as yet to demonstrate a massed vibration of the apparatus under the stimulus of a faint sound. It has been lately proven (Mader with the microphone, Nuvoli with the auto-stethoscope), that the vibrations of the apparatus are mostly molecular, such as any other solid takes up. There remains only to determine whether it is these molecular vibrations which produce the excitation of Corti's organ, when they are conducted to the labyrinthine fluid. Against this conclusion, we have the whole anatomical plan of the ossicles—that is to say, their articulation and their delicacy—which, in many animals, extends to the utmost possible limits, and, further, their medullary structure. All these facts tend to a reduction of their conductive power; and finally, the unequal length of the crura of the stapes conduces to sound interference in the foot-plate. Although the more delicate phenomena occurring in the ossicular chain during the process of sound conduction have not yet been demonstrated, we cannot doubt the great importance of the drum and ossicular chain in connection with sound transmission, since the phonograph and telephone have shown to what a high degree a tense membrane is able to receive sound and to give it up again.

An explanation of sound conduction in the labyrinthine fluid, that is, from the foot-plate of the stapes to Corti's organ, offers greater difficulty in man and terrestrial animals than in the whale. The excitation of the latter organ by

sympathetic vibration of the fibres of the basilar membrane, according to von Helmholtz, is still the only theory with which we can work, because it is founded on the anatomical structure of Corti's organ, which is composed of evenly stretched strings, gradually increasing in size.

The chief question under debate is, By what kind of motion are the basilar fibres put in vibration by the labyrinthine fluid,—whether by mass movement or molecular movement? This question remains unsolved. Von Helmholtz himself has expressed no opinion on the subject, but it can be inferred that he had molecular movement in mind, because he bases his theory on the phenomenon of sympathetic vibrations which is a phenomenon of molecular forces.

If we wish to continue in our investigation of this question, we must first determine what kind of motion is produced by the impact of one body upon another. An impact upon a body of air produces both a mass movement and a molecular movement. A mass movement can be demonstrated by filling the air near the impinging body with smoke, and by observing its movements. The molecular movement, on the other hand, will become evident by the production of sound, provided the impact is repeated with sufficient frequency. If a vibrating tuning-fork is immersed in water, we will observe complicated movements near the fork called "waves." These are mass movements. The molecular movement, however, in the shape of sound, is propagated far beyond the undisturbed water. Aside from the fact that the former movement is visible, and the latter audible, the mode of propagation of the two movements is widely different. The water waves travel with a variable speed, dependent on the conditions, but always slow enough to be visible (Weber Brothers). Sound waves, however, travel through water at a constant speed of 1436 metres per second.

The vibrating stapes, impinging on the labyrinthine fluid, produces the same double movement as the vibrating tuning-fork immersed in water. It must be very simple if the drum and chain of ossicles are set in motion by a simple tone; but it must necessarily be exceedingly complex if it is excited by a complex tone. We cannot form a very defi-

nite conception of the complexity of these movements, but perhaps can arrive at a better understanding by a comparison with the phonograph.

If we speak into the receiver of the phonograph, both the plate and the style connected with it are set into mass vibrations. The style impinges on the cylinder, and carves out of its soft mass the well-known complex furrows; in other words, the style performs a mass movement upon the cylinder. The molecular movements which the impinging style must produce in the wax could be perceived as sound were it possible to place the ear against the cylinder, or if Mader's ear microphone were used. We could make an experiment analogous to the experiment with the resounding tuning-fork, if instead of resting the style against the cylinder it were immersed in water. It would then be possible to see even a minimum displacement of the water near the pencil and to easily hear, with Kayser's water telephone, the sound transmitted into the water.

The question which next occurs to us is, By what form of movement are the basilar fibres brought into vibration? Viewed from the standpoint of molecular movement, it would be readily understood according to the well-known phenomenon of the sympathetic vibrations of the strings of an open piano, after calling into it and from which the damper has been removed. The theory of mass vibration would explain a simple tone, but not a mixture of tones. Finally, the fact that the basilar fibres of the whale are made to vibrate by molecular movement, confirms the theory of molecular movement as existing in land mammals and man. If the transmission of sound through the phonograph and the drum excite the same movements in the cylinder and labyrinthine fluid respectively, the difference between the two apparatuses would seem to be entirely in the application of the forces; thus, the phonograph utilizes all the massed movement excited by the style on the cylinder, but neglects the synchronously produced molecular movements. The ear, however, utilizes the molecular movements generated by the stapes in the labyrinthine fluid, and discards the synchronously produced massed movements of the latter.

After these introductory remarks, based on physical experiments, we may now turn to the question of how we can picture to ourselves (1) the course of the molecular movement in both animals and man, and (2) the course of the mass movement of the labyrinthine fluid.

(1) The molecular movement will penetrate into the cochlea with greater difficulty than in the whale, for in the whale the oval window and the entrance into the cochlea are situated at the end of the tube-like vestibule. In terrestrial mammals and man, both openings are situated on the external side of the ampulliform vestibule. The principal sound wave proceeding from the stapes-plate can not reach the cochlea by total reflection as in the whale, but only by partial reflection, from the mesial side of the vestibule, against which the main sound wave first impinges. In any case, the sound reaches the cochlea with greater loss of energy than in the whale.

The conditions, with the stapes in the erect position, are unfavorable even for the partial reflection of the principal sound waves from the mesial wall of the vestibule to the entrance into the cochlea, because the entrance is situated below the oval window, and the mesial wall is divided in such a fashion, into the recessus ellipticus and the recessus hemisphericus, that the middle line of the stapedial foot-plate lies opposite the shelf of bone separating the recesses. The reflection must necessarily become more favorable if the stapes-plate lies obliquely, looking downward or forward. A more exact investigation of these conditions can be carried out on an accurately enlarged model. The obliquity of the stapes-plate downwards, which, according to von Helmholtz and Henke, accompanies every inward movement of the drum, can be produced by sound striking the drum, and also by contractions of the tensor tympani. The obliquity forwards is caused by the stapedius muscle. In this manner, by the combined function of the tensor and the stapedius muscle, the stapes-plate may be adapted voluntarily for the maximum of the reflection in the vestibule. This voluntary adaptation is called "listening." In former times, the stapes was called the "harkening muscle," because it was

said that watchful animals, in harkening, turned the concha toward the sound, and as the muscles of the concha and stapedius are innervated by the facial nerve, in all likelihood a contraction of the stapedius takes place simultaneously with that of the muscles of the outer ear. Recently Ostmann has proved convincingly that the stapedius contracts in the dog while harkening. The tensor and stapedius may therefore be regarded as muscles of accommodation, but not in the former sense that these muscles adapt the tension of the drum and the pressure in the labyrinth to the tone to be perceived. The fixation of a sound by the ear, the fixation of an object by the eye, are thus analogous processes which are accomplished by different physical means: on the one hand, by a change of reflection; on the other, by a change of refraction; in both cases, by muscular effort. I believe, therefore, that sound conduction in the labyrinth takes place with equal precision to light conduction in the eye, and we will understand this more easily when we bear in mind that sound conduction is subject to a large extent to the same laws as is light conduction.

This entire reasoning may savor too much of theory. We have been led to it by comparative anatomy. The only plausible explanation of the tubular reconstruction of the vestibule of the whale is that after the loss of the mobility of the stapes-plate delicate hearing would have been impossible for the whale in the presence of an ampulliform vestibule, and that this transformation into the tube-form attempts to correct this defect. The only difference is that in the whale reflection is focussed to the maximum, independent of the will, while in terrestrial mammals and man it is a voluntary function.

(2) The motion of the stapes-plate is, theoretically, both a lever and a piston movement, which, in reality, are combined. The lever motion takes place on a vertical or horizontal axis, and results in the above-mentioned obliquities of the stapes-plate. If we consider one of the lever motions and assume that the axis upon which the movement occurs is the fixed one and that this axis divides the stapes exactly into two equal parts, then there will be, with every

movement on this axis, as much of the stapes-plate to project on one side as is pushed in on the other. In this manner, there is never an increase in the volume of the contents of the labyrinth, and no reserve chamber is required for the displaced labyrinthine fluid. The mass movement of the labyrinthine water which ensues is a simple backward and forward flow between the two halves of the stapes; it is not a wave movement, because a free surface of the fluid is necessary for waves, which is here wanting.

For the piston-movement of the stapes foot-plate an overflow chamber is necessary, because water is practically incompressible. The necessary yielding is supposed to be furnished by the *membrana rotunda* since the time of Ed. Weber. Let us consider that the *lamina spiralis ossea* joins the lateral labyrinthine wall, then the movement of the fluid, resulting from the piston-movement of the stapes, will proceed, without a doubt, from the foot-plate to the entrance into the *scala vestibuli*, then up the *scala vestibuli* and finally through the *helicotrema* into the *scala tympani*—as was shown by von Helmholtz. This movement is not, moreover, a wave movement, but a flux and reflux. The area of the *helicotrema* is considerably smaller than the surface of the foot-plate, and if there were no other possibility of escape for the fluid than this one there would be considerable resistance-opposing movements of the foot-plate on account of the smallness of the *helicotrema*. This does not seem to be in accord with the facile vibration of the ossicles required in faint sound conduction. There must, therefore, be a second place for escape. The aqueducts cannot, generally speaking, be considered, as they offer too great resistance on account of their narrowness and length. We can consider therefore only the membranous part of the *ductus cochlearis*. The *membrana Reissneri* is but slightly tense and is easily pressed in. The basilar membrane, however, has not this quality, because its rough chords are strongly stretched, as can be inferred from the strength of the tension apparatus, the *ligamentum spirale*, whose fibres, for the greater part, converge towards the basilar membrane. Under these circumstances, the piston-movement of the

stapes would cause yielding of the membrana basilaris against the scala tympani, if there were no other mass in the ductus cochlearis more easily displaced than the basilar membrane. This mass I consider to be the blood in the capillaries of the stria vascularis, which is so superficial as to be easily compressed. We must therefore ascribe to the stria, besides its own function of supplying lymph for the ducts, the function of providing easy movement for the stapes because of its ready compressibility.

From this it is clear that the mass movement of the labyrinthine fluid has no effect upon the basilar membrane, and that molecular movement alone causes the vibration of the basilar fibres, which must be of the greatest advantage for the exact vibration of the strings of an instrument made on the pattern of Corti's organ.

In conclusion, I wish to make a brief observation as to how this theory, proceeding from comparative anatomy, must explain the pathological changes in sound conduction of the human ear. We are concerned especially with an explanation of increased bone-conduction. If the conduction from the rim of the oval window to the stapes-plate is improved, whether by increased tension of the annular ligament, by retraction of the drum, or by interference from an exudate by fibrous or by bony ankylosis, sound conduction from the bones of the cranium to the stapes-plate is naturally improved, as we have just shown that the stapes-plate is to be considered the place from which the excitation of Corti's organ proceeds with the greatest ease, then improved hearing for bone-conduction follows an easier transmission of the sound waves from the bone to the stapes-plate. This finds its expression in the increased duration for hearing a tuning-fork placed on the skull. This more or less agrees with the explanation of this phenomenon given by Bezold and others.

OPERATIVE OPENING OF THE MASTOID BONE
IN OTITIS MEDIA PURULENTA WITH EX-
TENSION OF THE DISEASE BENEATH THE
MASTOID PROCESS.¹

BY DR. FERDINAND LEIMER.

Abridged Translation by Dr. JULIUS WOLFF, New York.

DURING the period from 1892 to 1901, ninety-seven cases of acute middle-ear suppuration with complications were observed, which required operative opening of the mastoid bone. Among this number there were 17 cases in which the disease spread underneath the mastoid process.

This form of mastoid disease was first described in 1881 by Bezold, who gave to it the character of a well-defined clinical picture, and, furthermore, showed that this form of pus burrowing occurs almost exclusively in the acute middle-ear diseases.

The sexes were represented in the 17 cases as follows: 14 males and 3 females. Whereas, in the ordinary form of mastoid disease there is a well-known ratio of about 6 : 4 in favor of the males, the preponderance of the latter sex is even more pronounced in the cases with burrowing.

A comparison of the ages at which mastoiditis and Bezold's mastoiditis preferably occur, shows that the former most frequently occurs during the first three decades of life, while the latter is found most frequently in the third, fourth, and especially the fifth decades. The cause for the absence of the burrowing processes during childhood and for their

¹ Report of seventeen cases from the Royal University Ear Clinic, Munich.

frequent occurrence at later ages, is to be found in the anatomical conditions that will be described later.

The time which elapsed from the appearance of the first signs of ear inflammation till the operation was in 2 cases less than one week, in 10 cases three to thirteen weeks, and in 2 cases six to seven months. The early period at which the first 2 cases were operated upon was fully justified by the menacing conditions that were found. All the patients had to be operated upon within a very short time after their admission to the hospital.

In 5 of the cases the patients were unable to designate a cause for their ailment; in 3 of them a nasal catarrh was mentioned, and in 1, tonsillitis. Other causes assigned were erysipelas, traumatism, bathing, douching of the nose, and snuffing tobacco.

The hearing was tested in all cases immediately before treatment was begun, showing that in 4 cases whispered voice could be heard at 4 metres; in 4 others, at 20 to 60 centimetres; in 2, at 10 to 20 centimetres; in 5, at 1 to 10 centimetres; and in 2, not at all.

The external canal, drumhead, and tympanic cavity presented in general the same appearances as in mastoiditis. In no less than 5 cases there had never been a discharge from the ear, and in 4 of these paracentesis was performed, with resulting muco-purulent discharge. Among the 11 cases which perforated spontaneously, there were 6 in which the canal was almost occluded by swelling of the upper-posterior wall.

The mastoid portion and its surroundings presented in most cases the well-known characteristic appearances. The greater portion of the mastoid region usually remains more or less free from swelling and tenderness. The latter, together with redness and pain, generally only begin below the oblique line of insertion of the muscles at the mastoid process, from there extending to the region below the mastoid process and more or less completely filling up the retromaxillary fossa. The inflammatory process sometimes even extends backward as far as the median line and, in the most pronounced cases, down to the upper dorsal vertebræ.

It is rare for this board-like infiltration to break down and form a superficial abscess at some remote point. In two of the cases the only swelling noticeable before the operation was at the usual region above the insertion of the muscles; but in six and fourteen days, respectively, after the operation tenderness and swelling appeared below the mastoid process, which increased to such an extent that counter incisions became necessary. In the remaining cases the swelling below the mastoid was present before the operation, at times even filling the retromaxillary fossa, whereas the region over the mastoid was normal and free from tenderness.

The time at which the swelling below the mastoid process appears may vary from a few days to several months after the onset of the first acute aural symptoms. The important factors in this respect are the size and position of the pus-containing cells, of which those located at the tip and to the inner side of the same most favor perforation downwards. Another factor is the thinness of the walls of the cells that lie at the lower surface of the mastoid, and finally there is the presence of pre-existing dehiscences in this wall.

The general symptoms of which the patients complained were pains in the head as well as in and below the ear, fever, with more or less severe chills or pyæmic symptoms, and rigidity of the neck.

Changes in the background of the eye were found only twice, and then were only slight.

Sufficient indication for operative interference in cases of acute middle-ear suppuration, with extension of the process underneath the mastoid, is given by the presence of the characteristic diffuse swelling which more or less completely masks the outlines of the mastoid process. Other indications for operation were found in severe and prolonged febrile conditions, in fistula at the floor of the external canal, and the long duration of the middle-ear disease.

The opening of the mastoid bone is begun by applying the chisel low down at the very tip of the mastoid process, thereby at once separating and removing the insertions of the muscles attached to it. Hereupon, the outer cortex is removed, the antrum exposed or rather opened at its

posterior end, and, finally, the rest of the mastoid process is removed. The result is a large defect in the mastoid portion extending above and anteriorly into the antrum and bordering below on the soft parts subjacent to the mastoid process.

Often there may be large cells filled with pus and granulations extending inward beyond the mastoid groove, so that it may be necessary to push forward to the jugular bulb, which, however, must not be injured.

Finally, the periosteal elevator is pushed in above the soft parts underneath the base of the cranium, in order to empty any pus cavities that may be situated here. The procedure often suffices to bring about healing, for with the opening of the mastoid bone the source of the pus has been exposed. But when there are larger accumulations of pus deep in the soft parts, the indication is to push the elevator underneath the muscles to the lower end of the abscess and at this point to make a counter-incision.

The condition of the soft parts in our 17 cases presented almost a uniform appearance, inasmuch as in 15 of them there was a more or less extensive swelling underneath the mastoid process, while the soft parts over the mastoid bone were unaltered. In the other 2 cases the soft parts underneath the process were normal, whereas there was a large fluctuating tumor behind and above the auricle. In both these cases the burrowing of the pus downwards did not occur until after the operation.

The outer bony surface of the mastoid portion was found unchanged in 12 of the cases, while in 4 there was a fistulous perforation of varying size. This perforation of the cortex is caused by the gradual excentric enlargement of the cavities in the mastoid through absorption of the lime salts in the bone surrounding the pus-containing cells.

In opening the mastoid with the gouge, it was repeatedly observed that the outer wall was dense and compact, while the walls of the underlying cells were thin, shell-like, and fragile. This circumstance readily explains why in such cases perforation takes place at the inner surface of the process.

The contents of the cell-spaces consisted in 13 cases of

pus and granulations, the latter being present mainly in the cases of long duration. The bacteriological examination of the secretions removed from the pus cavities in this form of mastoid disease revealed in most cases the diplococcus pneum., while some showed streptococcus pyog., and even staphylococci.

Bezold has repeatedly drawn attention to the fact that the large preformed cell-spaces in the mastoid bone afford, so to speak, an anatomical predisposition to the formation of empyemas of the mastoid. More especially do the terminal cells, which gradually increase in size towards the periphery of the mastoid, predispose to the collection of pus; for, being situated low down and far from the principal cavity, the antrum, they offer mechanical obstacles to the discharge of the pus. Furthermore, these pre-existing cavities are still further enlarged excentrically by the absorption of lime salts from the bony walls of the pus cavity. The bony septa also disappear in consequence of this process, thereby reducing the proportion of absorbing area of mucous membrane to cell contents.

The excentric enlargement of pre-existing cells may assume such proportions that the whole mastoid portion is turned into a single large cavity, or that perforation of the bone may take place in any or all of three directions, outwards, inwards, and downwards.

In discussing the ages of our 17 cases, it has already been pointed out that the more advanced periods of life are the ones most subject to diseases of the middle ear with burrowing of pus under the mastoid process. Since anatomical experience teaches us that the occurrence of large cells increases with age, we readily understand why the form of disease under discussion is most frequent in the advanced periods of life. Conversely, its rare occurrence in childhood is due to the poor development of the cells at this time of life.

These cells may extend so far back that the sigmoid sinus is surrounded by them, and it may even form the anterior wall of one of these posteriorly situated cells. In a down and inward direction they may extend as far as the jugular bulb.

During the process of chiselling open the mastoid bone or curetting the granulations out of the cells, it not infrequently happens that the soft sinus wall, bared of bone, lies exposed in the wound. In such cases the appearance of the sinus wall may vary considerably, being at times free from deposits and of normal color, while at other times there may be a covering of thick masses of granulation tissue. It must be assumed that in these cases the sinus was bared by the process of lime-salt absorption mentioned above. It is then found to be either bathed in pus or covered with granulations that are continuous with those filling the cell spaces. If this layer of granulation is carefully scraped away with a sharp spoon, dura of a comparatively normal color often is revealed.

Although, when this complication is present, the sinus lies just adjacent to the pus cavity, the symptoms are frequently so mild in character that it is not possible to conclude before the operation that there is present a condition so threatening to the sinus. In other cases, however, we may have indications of a beginning pyæmia.

In those cases in which, before the operation, there were no marked constitutional symptoms, the evacuation of the pus lying against the dura suffices to allow us quietly to await further development, inasmuch as the sinus is freed from its dangerous surroundings. This expectant treatment proved itself justified in a number of our cases, as no further symptoms referable to sinus trouble appeared.

Secondary operations were required in 9 of our cases. Twice it was necessary to ligate the internal jugular vein and to open the sinus, with the result that one patient recovered, whereas the other died of pyæmia. In 4 other cases counter-incisions had to be made. In 1 case repeated counter-incisions had to be followed by extensive opening of an abscess in the soft parts of the neck. Another case developed an extradural abscess which was laid bare, and still another developed behind the operative wound a small superficial abscess that required incision.

The systematic after-treatment of the operative wound consists in changing the dressing at first three times, later twice, a week. As the granulations on the walls of the bony

cavity increase, the tampon that was inserted into the wound is gradually shortened more and more, so that the wound, if it takes a normal course, is generally closed in about four or five weeks. When a counter-incision has been made, it must be kept open by drainage until all infiltration of the surrounding soft parts has disappeared and no more pus is evacuated.

Of the 13 cases that were cured, 11, or about 84 %, recovered normal hearing inasmuch as whispered voice could be heard at from 6 to 9 metres, while before the operation the hearing distance for whispered voice was in all cases less than 60 centimetres.

Summarizing the final results, the following is to be noted: Of the 17 operated cases, 13 were discharged cured, 3 died, and 1 discontinued treatment. The mortality of acute middle-ear suppuration with burrowing of pus in the neck is, therefore, if we disregard the case that stayed away, 18.7 %, whereas the operated cases of mastoiditis that did not present this complication showed a mortality of 8.8 %. If we further exclude from our statistics one case, which ended fatally, independently of the aural condition, on account of myo-degeneration of the heart and pulmonary œdema, there still remains a mortality of 13.3 % for Bezold's mastoiditis against 8.8 % for simple mastoiditis.

REPORT OF THE TRANSACTIONS OF THE NEW
YORK OTOLOGICAL SOCIETY, MEETING
OF MARCH 22, 1904.

By DR. ARNOLD KNAPP, SECRETARY.

DR. EMERSON, PRESIDENT, IN THE CHAIR.

PRESENTATION OF PATIENTS.

Dr. WILSON presented two children who showed **involvement of both eyes and ears, due to hereditary syphilitic disease.**

The first was a girl of thirteen; her eyes were affected (interstitial keratitis) and then her ears. The hearing was entirely lost in one week. Pilocarpin injections were administered for three months, without any effect. The child also complained some of vertigo and ataxia.

The second case was a girl of eleven, whose eyes were very severely involved (irido-choroiditis). She was under mixed treatment for nine months, with slow improvement of eyes, when her ears became affected. In ten days hearing in the right ear was totally lost, and in the left it was reduced to the hearing of a loud voice at the ear. After a prolonged treatment with pilocarpin injections, the left improved so that a loud voice could be heard at three feet; the right remained totally deaf. There was some naso-pharyngitis in both. The membranæ tympani were not entirely normal.

Dr. BERENS inquired up to what dosage pilocarpin was given.

Dr. WILSON replied, up to $\frac{1}{4}$ gr.

Dr. HEPBURN inquired whether there was any bone-conduction.

"There was none in three ears, and in the fourth air-conduction was better than bone-conduction."

Dr. MCKERNON asked whether the congestion of the drum was always present as it is to-night.

"There has always been some congestion of the drum."

Dr. EMERSON said that he had always found that the middle ear was affected, as well as the internal ear, and that the middle ear in these cases appeared to be congested. He had been able to derive considerable benefit for his patients by inflation and the application of leeches.

Dr. WILSON had ignored the middle ear and asked for advice as to the best course of treatment to pursue, and also whether the middle ear should be treated.

Dr. BERENS was decidedly of the opinion that the middle ear should be treated.

Dr. MCKERNON thought that there would be no result from the middle-ear treatment.

Dr. GRUENING coincided with this.

Dr. WILSON, in conclusion, drew attention to the difference in prognosis between the lesion in the eyes and in the ears.

Dr. WILSON presented an **aluminum forehead mirror**, which appeared to be very light and practical. The joint was a double ball socket, and the mirror could be brought very close to the eye.

VOLUNTARY CONTRIBUTIONS.

Dr. LEWIS reported on a case of acute mastoiditis, where the infection was due to the **meningococcus**. The patient did perfectly well.

Dr. MCKERNON spoke of the two cases of meningococcus infection which he had reported some time ago. In the first, the infection was very rapid after one day; the congestion in the upper and back part of the drum was followed by bulging and a tender mastoid. Paracentesis gave a fluid containing the diplococci. On the same day in the evening an operation was done, and the mastoid was found completely infiltrated.

In the second case, a patient of thirty-three years of age, the process was not so rapid. Paracentesis was done after twenty-four hours, and the operation on the third day, with complete recovery.

Dr. GRUENING said that in regard to the bacteriological examination of ear cases, he had been struck to see how frequently pneumococci were found in the examinations in certain clinics, and he thought that that was very apt to be due to an error, because the cases were really streptococci. He said that at the Mt. Sinai Hospital, where very careful bacteriological examina-

tions were made, out of fifty cases the streptococcus was found in forty-seven, and the pneumococcus in only three.

Dr. ARNOLD KNAPP stated that in the last two years he had examined all of the purulent otitic cases, and had found, especially during this year, the pneumococcus infection very much more frequent than in the ratio which Dr. Gruening had given. The diagnosis was not made by cover-glass examination, but the organisms were cultivated in every case.

Dr. ADAMS reported on a fatal case of **meningitis** after operation. The patient, whom he had seen on the 7th of the month, had been operated upon before and a fistula remained. He performed the radical operation. The case did perfectly well, except for some granulations near the Eustachian tube. On the 15th, skin grafts were applied. Temperature went up on the following day to 103° and remained pyæmic in type for three days, when the patient became comatose. The sinus was uncovered. It appeared perfectly normal, containing fluid blood. The dura over the tegmen was exposed and bulged unusually. It was incised, and the brain was punctured in various directions with a negative result. The patient had had some headache before the operation.

Dr. MCKERNON inquired whether any fluid had escaped on incising the dura.

"No, but there was an unusual amount of cerebral hernia."

Dr. DENCH inquired whether puncture of the lateral ventricle had been performed.

"No." He thought that the case resembled serous meningitis.

Dr. ADAMS spoke of another fatal case of **meningitis**. A child of eight years suffered from a double mastoiditis after an attack of measles. On Wednesday at five o'clock the bulging drums were incised. During the following three days the symptoms of mastoid involvement were apparently clear from the temperature and discharge. Operation was not permitted. Finally, when the operation was performed, both mastoid processes were found completely involved. Death occurred two days later, apparently from meningitis. The affection appeared to be very virulent, and the child was poorly developed.

Dr. DENCH said he had given up the use of the ice coil; he thought it masked symptoms and was a confession of weakness.

Dr. GRUENING had been of this opinion for five years. He cited the case of a girl fourteen years of age with a scanty

discharge, mastoids very tender. Operation after twenty-four hours. Both mastoid processes were infiltrated and there was great destruction. In Dr. Adams's case the pus was in the bone itself. It oozed out, and the bone was mushy—a form which he had always found to be fatal.

Dr. MCKERNON uses heat rarely.

Dr. ADAMS asked **what treatment** the members of the Society now favor **after paracentesis**.

Dr. BERENS is in favor of hot douches after paracentesis. If this does not relieve symptoms, operation is indicated.

Dr. GRUENING, for the tenderness after paracentesis, applies the hot-water bag. He thinks that the ice-bag misleads, and that hot water has all the advantages without any of the disadvantages.

Dr. ADAMS asked how long the hot applications were applied.

Dr. GRUENING remembered a case in which he had applied them for a whole week—in which all the symptoms disappeared.

Dr. DENCH thought that in judging of an operation we were guided by the condition of the patient, the condition of the fundus, the amount of discharge, and the tenderness. He considered one of the most important symptoms to be a shortening of the canal. He was distinctly an advocate of early operation.

Dr. GRUENING thought that this was dangerous teaching. He had recently seen a case of otitis in a child of two years, after scarlet fever. Paracentesis was performed; the temperature went up; the paracentesis opening was enlarged; the temperature again went up, and persisted for five days. He would not operate, much to the surprise of the attending physician, as he was convinced that there was no mastoid inflammation. The child got well. He did not think the mastoid operation was a simple affair.

Dr. DENCH was inclined to believe the favorable termination of this case was due to good fortune, and it would have been much safer to have opened the mastoid when the temperature began to fluctuate. In regard to performing paracentesis the second time in the same patient, he remembered having to do this only twice in his life. If a thorough paracentesis has been done under anæsthesia, and a second one becomes necessary, he regards it as an indication for making drainage posteriorly—in other words, for opening the mastoid.

Dr. GRUENING does not agree with this view at all.

Dr. DENCH was asked what was the shortest time in which he

would operate after paracentesis. He said from twenty-four to thirty-six hours.

Dr. DUEL asked Dr. Dench whether he considered that the sagging of the canal wall was invariably present.

Dr. DENCH said it was not always present.

Dr. DUEL reported two cases on which he had recently operated, in which the drums and the canal had returned to a normal condition and the mastoids were affected.

Dr. MCKERNON thought that the point of tenderness in young children was very difficult to elicit.

Dr. DENCH stated that we should be guided by the amount of discharge and the height of temperature.

Dr. DUEL had noticed in children that, after cleansing the drum, on pressing down over the antrum pus could often be forced through the perforation.

Dr. HARRIS stated that he thought this was a very important question and he would be extremely grateful for further information—especially what experience the members of the Society had had *in avoiding operations*.

Dr. BACON replied to this question in referring to a paper which he had read two years ago before the Section on Otology, in which he gave a description of 100 consecutive cases from his private practice, of acute purulent otitis with mastoid symptoms, in which 75 recovered without operation and 25 led to operation.

Dr. DENCH drew attention to the statistics which had been gotten up at the Eye and Ear Infirmary, where, in spite of abortive treatments, most cases where the infectious organism was the streptococcus came to operation: in pneumococcus infections 50 % got well without operation; and in staphylococcus, practically all recovered. He thought that the operation for acute mastoiditis was limited to the danger of the anæsthesia; though he was in favor of having a bacteriological examination made, he thought that no one would place the value of this examination over the clinical signs.

Dr. LEWIS thought that some of these cases were made worse by too much syringing, and that in cases of slight or serous discharge he had obtained the best result by using gauze packing, which was inserted at regular intervals by the nurse.

Dr. GRUENING also prefers a drain to syringing, in adults.

Dr. ADAMS inquired of the advantage of suction manipulations.

Dr. GRUENING thought that he had been able to derive a great deal of aid from this procedure, and had often succeeded in removing considerable discharge from the middle ear.

Dr. HEPBURN spoke of a case of **otomycosis**, due to the **aspergillus niger**, which had been cured by three applications of pure carbolic acid, neutralized by alcohol.

Dr. McKERNON reported on a case of **primary jugular-bulb thrombosis** in a child aged three years; temperature 104.4° , the right drum bulging, the left normal. Right paracentesis; pus evacuated; hot douches applied. On the following day the temperature dropped to 99° , but went up again to 104° in the evening. The child was uneasy; the right ear was discharging. As the left drum was now bulging, it also was incised. On the following day the temperature varied between 105.5° and 98° . He made a diagnosis of jugular-bulb thrombosis, and suggested operation, which was not permitted. The pus gave a culture of streptococcus. On the following day the temperature was 102.8° ; the drum was bulging; there was discharge. That evening he operated, and found the mastoid to be only slightly involved; he exposed the sinus and the bulb. In the upper part the sinus appeared dark; but below, distinctively gray and yellowish. The sinus was incised and the bulb was curetted and a clot removed. Free hemorrhage followed. An uneventful recovery took place. The temperature slowly dropped. In another case, the course was favorable for fourteen days, then encephalitis followed with death.

He spoke of the frequency of jugular-bulb thrombosis in children. He thought that, if the temperature were typically pyæmic and if the middle ear were inflamed and discharging, an immediate operation should be performed. In his first case there was no leucocytosis, but streptococci were found in the blood.

Dr. TOEPLITZ reported on a case of **sinus thrombosis**, where the only symptoms were a temperature of 107° and a profuse discharge from the middle ear. The sinus was covered with granulations, and thrombosed. After the removal of the thrombus and the restoration of the blood current, the patient proceeded to an uneventful recovery.

Dr. GRUENING spoke of two cases occurring in the general wards of the Mt. Sinai Hospital, where the diagnosis of lateral-sinus thrombosis had been made by the house staff, as all the other possibilities had been excluded and the drum showed changes of old aural disease. Both patients recovered.

Dr. KENEFICK has been taking care of about twenty children with **purulent otitis after measles**, in the Foundling Hospital. Though the epidemic of measles is supposed to be severe in institutions, not one of these cases presented any complications except erosions of the canal.

Dr. DENCH spoke of the **accidental opening of the jugular bulb during the radical operation**. In endeavoring to expose the hypo-tympanic recess, he inadvertently opened the jugular bulb. The hemorrhage was easily controlled, and did not interfere with the subsequent treatment nor with the skin grafting.

Dr. TOEPLITZ spoke of **exfoliation of the cochlea** in a patient he had recently seen, nineteen years of age, where, after a paracentesis had been made necessary, granulations always reappeared. Two weeks ago he removed a large fragment, which proved to be a piece of the cochlea. On more careful investigation he found that the case was an old one.

Dr. BACON had recently seen a case of **labyrinthine involvement after measles**, occurring at the same time with the middle-ear complication. The discharge had ceased, leaving the patient very deaf. The drums had healed.

Dr. QUINLAN reported the following cases :

CASE 1.—I. O. F. came to my service at St. Vincent's Hospital with several exostoses of the external auditory canal. These were removed after separating the auricle from its attachment. The wound was plugged with iodoform gauze and the auricle stitched back to its attachment. No fever nor severe reaction followed, but after the twelfth day the other ear, which had been the seat of a suppuration twenty years ago, suddenly discharged, which discharge was followed by a severe case of facial erysipelas.

CASE 2.—I saw a patient about fifty years of age a few nights ago in a moribund condition, with the following history. An old suppurative condition of one year's standing. Patient was so well the preceding night that he called at his physician's office and complained only of slight neuralgia over the parietal and temporal regions. During the night he had a well marked chill, followed by nausea, which lasted several hours, from which he lapsed into a condition of unconsciousness, from which, however, he could be roused. P. 140. T. 104° F. The condition was so sudden and so alarming that operative interference was suggested, but the man's appearance forbade such a step. He

never regained consciousness, but died within an hour after I had seen him, presumably of meningitis.

Dr. ARNOLD KNAPP presented a specimen of turbid **cerebro-spinal fluid** obtained by lumbar puncture in a patient who had been operated on for chronic purulent otitis and cholesteatoma three weeks ago and presented all the symptoms of meningitis. The turbidity of the fluid was due to leucocytes, but was absolutely sterile. On account of this condition of the fluid an unfavorable prognosis was made and no operation was performed; the patient has gotten well.

Dr. GRUENING said that he did not lay so very much stress upon lumbar puncture. He remembered a case of a boy whom he had operated upon for brain abscess some five years ago. He was taken very ill with convulsions and stupor, with the discharge of a serous fluid from his ear. Lumbar puncture was performed and the fluid evacuated was distinctly turbid, and contained streptococci. The case recovered.

REPORTS OF THE TRANSACTIONS OF THE SECTION ON OTOTOLOGY OF THE NEW YORK ACADEMY OF MEDICINE.

MEETING OF FEBRUARY 11, 1904.

DR. HERMAN KNAPP IN THE CHAIR.

PRESENTATION OF CASES.

Dr. DUEL exhibited a case of **paroxysmal cough relieved by an operation on the ear**. The patient, a boy, was brought to him two years ago with the history of a cough which had lasted for seven years, following an attack of scarlatina, with a perforation and discharge from the left ear. At the time he was brought to the doctor, he had very much enlarged pharyngeal and faucial tonsils, and on examination of the left ear a slight purulent discharge and what appeared to be a mass of impacted cerumen were discovered in the canal. On attempting to syringe the impacted cerumen, or on the slightest touch with the probe, the boy was thrown into a violent paroxysmal cough which amounted almost to spasm. Dr. Duel advised removal of the faucial and pharyngeal tonsils under an anæsthetic, thinking at the time that he would remove the mass from the ear. A week or two later the tonsils and adenoids were removed, and on syringing the ear it was found that the brownish discoloration which had been noticed was due to the cerumen covering a cholesteatomatous mass which filled the canal and middle ear. As much as possible of this was curetted from the canal; it filled the tympanum and the attic. As it had been expected to find only the impacted cerumen and the perforation back of it, nothing further was done. The paroxysmal cough was relieved for two months; the boy became a nose-breather instead of a mouth-breather and improved much in general health. The radical operation for the re-

moval of the mass in the ear was advised, but consent refused. After an absence of a year, the boy was again seen last October, with the history—that about two months after he was last seen the cough began again and had continued, in spite of all efforts to relieve it. The radical operation was again advised and was performed about thirteen weeks ago. The mass was removed. It was found that it involved the attic and the mastoid antrum, and had eroded the roof of the antrum and attic. Ten days later, when the whole curetted surface was covered with healthy granulations, Thiersch skin grafts, lining the cavity, were introduced. At the end of twelve weeks the wound is perfectly dry and the boy is entirely relieved of the paroxysmal cough. The cough was attributed to the cholesteatomatous mass pressing on Arnold's nerve, over its distribution in the canal.

Dr. HARRIS presented a case with a **swelling in the auditory canal**, in which he asked for suggestions as to diagnosis and treatment—an old case of frontal-sinus disease, which from the beginning had been particularly baffling. About eight weeks ago the patient complained of pain in the left ear, due to an acute suppuration in the middle ear. Upon examination, there were bulging and a certain obstruction on the floor of the canal. Paracentesis was performed, the pain relieved, and since then a rather profuse suppuration has been going on; the swelling on the floor of the bony canal has persisted. It was discovered that there had been a specific disease twenty years ago. The patient was then put on fairly large doses of iodide of potash. In the last three days, a considerable swelling of the upper portion of the canal has been noticed. He has had no pain whatever until to-night, when he has complained of a little; there is very little sensation when the probe is used. The doctor asked: "What is the true character of the lesion in the canal? Is there a periotitis or an exostosis? Is it specific?" There is a positive history from the patient that he has never had any trouble from that ear before.

Dr. WENDELL C. PHILLIPS presented a case of nearly complete **natural dermatization of the middle ear and antrum**, simulating a radical operation. The patient first came to the clinic of the Manhattan Eye and Ear Hospital about three weeks ago, complaining of discharge in the right ear. The left ear was deaf, and on examination no evidence of any discharge was found, but complete destruction of the drum and ossicles, and

the interior of the tympanic cavity was dermatized. The patient had had chronic middle-ear suppuration since childhood, with an indefinite idea as to when the discharge from the left ear stopped; he thought it had been within a few months, but could make no positive statement. During the three weeks that he has been under observation, there has been no evidence of any discharge. The staff at the hospital examined the patient, and thought there was complete dermatization of the entire tympanic cavity. Dr. Phillips said he was inclined to think that if the case were watched some dropping from the attic region would be found. There is no particular evidence of a cholesteatomatous mass at the present time. The patient does not complain of the affected ear, beyond the deafness.

Dr. BERENS presented a case of **ligation and excision of the jugular vein for lateral sinus and jugular phlebitis**. The patient's history dates from childhood, when she had scarlet fever with a constant discharge from the right ear. A few days before he saw her, another aurist removed a large mass of granulation tissue from the right side. The patient was suffering from acute exacerbation of discharge when Dr. Berens first saw her, together with a well-marked mastoiditis. At that time the radical operation was performed. There was an area of necrosis of the bone over the lateral sinus below its knee. Removal of this bone disclosed a large area of granulation tissue on the lateral sinus wall. The sinus was exposed above and below, and apparently was not diseased. It was not disturbed. The next morning she was taken with a chill and high temperature— 104.8° F.; great pain and tenderness limited to the line of the jugular vein. The wound was re-opened, the sinus again laid bare, and the patch of granulation tissue exposed. The sinus did not look healthy for a small area around the granulation tissue; posteriorly the sinus was healthy, but below it was streaked. The jugular vein was exposed, and found to be in a mottled condition; the walls of the vein were extremely congested; also, the vein contained fluid blood; but the mottling and congestion were so marked, that it was decided to ligate and excise. Microscopical examination failed to reveal any infection of the wall, but there were small hemorrhages in the walls of the vein. The lateral sinus was opened, and contained a parietal clot beneath the granulation tissue. The patient did well for two or three days, when she was taken with a sudden attack of diplopia—

which, however, did not persist more than a few hours, and was attributed to other causes than that of the vein. She went on for a day or two longer, the wound in the neck was stitched, and four days later the dressing was changed; the wound in the mastoid was found perfectly clean, except for the two small sloughings at the point of the previous infection, at the site of the granulation tissue and clot. The wound in the neck was found boggy; it was opened, and found to contain a large amount of pus. This cleared up rapidly, but was followed by pus in the bulb; and in a day or two after there was a sloughing of the walls of the sinus. This slough was removed farther up and the sinus was repacked. In two weeks she developed a pleuro-pneumonia. She finally recovered. The original operation was done on November 16th; the ligation on the 17th. The examination of the eye grounds revealed the right nerve swollen; the left eye contained hemorrhages. The neuritis has disappeared, she has no disturbances in the right eye, and the hemorrhages are rapidly disappearing from the left eye.

Dr. LEDERMAN exhibited a case of gun-shot injury of three years' duration with **bullet imbedded** in situ in ear. Three years ago the woman had been shot at very close range by a .32-calibre revolver. The bullet entered above the tragus on the left side. She said she did not hear anything with the left ear since that time. After the injury she was unconscious for three weeks; and states she did not appreciate her surroundings for two months after that. On examination, a small scar above the tragus was discovered, bluish in color, which appeared as if there might have been an injury there some time in the past. There was a purulent discharge, and the canal of the ear was almost completely occluded by a fibrinous mass which was attached about $\frac{3}{4}$ inch back on the anterior surface. She felt as if something was in the ear. The bullet had not been removed. She had a facial paralysis following the injury, and was very unsteady on her feet for some time afterwards. The fibrinous mass was removed: it was about $\frac{3}{4}$ inch in length and about $\frac{1}{2}$ inch in thickness. After this was removed there was a free flow of blood. The wound was packed for a few moments. On removing the packing and examining the injured ear, a darkish mass was observed, and on employing the probe, this substance proved to be the bullet. It is wedged tightly in the internal wall of the middle ear, surrounded by granulation tissue, with the anterior

portion of the *Mt* in position. The only remaining question in her case is to get it out. Dr. Lederman said he would try through the canal first, and if this did not succeed, would resort to the radical operation.

Discussion.—Dr. PHILLIPS thought that the natural supposition in the case presented by Dr. Harris was, that there was some specific development, although he was aware that a gumma in that location would be unusual. A gumma should have, by this time, begun to subside under the treatment received from Dr. Harris. It was odd that the patient should have had a cellulitis extending over such a long period. The boggy appearance would suggest a collection of fluid; conditions not dissimilar are seen in the pharynx and throat.

Dr. WHITING said that several possibilities suggested themselves in connection with this case of Dr. Harris's: the fact that the man has in the other ear (the ear of which he does not complain) a well-defined exostosis of the meatus, almost symmetrical in the arrangement of the canal, with one exception: in the anterior superior quadrant there is a slightly bulging exostosis, so narrow as to be almost spicular in form; it practically covers up the anterior half of Shrapnell's membrane; the fact of the presence of an exostosis of that character, and the fact that the man had been for years a sea bather, together with the knowledge that he has had a specific condition, would lead one to infer that the mass which appeared on the infected side was probably a beginning periostitis, and that there was a productive otitis beneath it. There is a question whether that may not have become infected from the purulent discharge which has been going on for two years. The condition might be accounted for and kept up as long as there is an irritating discharge. It seemed to Dr. Whiting that this was an important element. He had had no experience with gummata in that location, but it seemed possible to him that it was a periosteal involvement with a productive otitis beneath it.

As to Dr. Phillips's case, he coincided with the opinion expressed by Dr. Phillips, that there was a cholesteatoma in the antrum. It was very evident, he said, that the inflammatory membrane there, the newly generated membrane, does not line the antrum, because it lies on a plane decidedly anterior to the promontory; he believed that it is held away from the floor of the antrum by an accumulation of cholesteatomatous material.

Dr. PHILLIPS inquired whether in Dr. Berens's case any clot was found in the sinus.

Dr. BERENS replied that there was none.

Dr. WHITING said he had understood Dr. Berens to say that the examination of the vein made showed no infection whatever; he wished to inquire if the sheath was examined when the vein was removed from the neck.

Dr. BERENS replied that the whole thing was examined, and no lymphatic infection found.

Dr. WHITING said that it seemed to him that if there were no lymphatic infection the wound, having been sewed up by primary operation, ought to have been healed. In cases where he himself sewed it up, the sheath of the vein was infected—as it was found on examination. He had found certain enlarged lymph nodes, all of which were infected. He thought possibly the sheath of the vein had not been examined in Dr. Berens's case, otherwise, he did not see how the infection in the neck occurred. In his experience, in every case where he had resected the vein and sewed it up, he had had infection and had had to open it. In his cases there was infection in the sheath, although in the wall there was no infection.

Dr. HARRIS remarked on the excellent result attained by Dr. Berens in this case. He had seen the case, and had followed the doctor in the dressings once or twice, and had believed that the patient never would get well. To-day she is the picture of health. He thought that Dr. Berens should have dwelt a little more on the neurological side of the case; he wished he would refer to what the neurologists have said to account for the various ocular symptoms—whether caused directly or indirectly from the infection in the neck.

Dr. GUTTMAN said that he was not quite clear about the diagnosis of the case, and its treatment. He understood that the diagnosis was made principally by the pyæmic fever and by symptoms of the eye; diplopia was mentioned, but no cause was assigned to it; the kind of diplopia was not stated, or whether it positively had anything to do with this lateral-sinus thrombosis. What was the pain along the jugular vein produced by? As he understood it, practically no severe infection of the jugular vein was found. He wished to know exactly what the indication for the ligation was.

Dr. LEDERMAN recalled the fact that some years ago he pre-

sented before the Section a young girl with jugular thrombosis, in which he had opened and curetted the sinus and had resected the vein. He left the neck wound open. The patient did very well for a week or ten days after the operation, when the temperature ran to 105° F, with swelling in the neck posteriorly to the neck wound. The case was watched for twenty-four hours, when the swelling appeared to extend farther backwards. It was then decided to operate. Incision was made over the point of the greatest tumefaction, but all that was found was a phlebitis, with the veins enormously dilated. After wet dressing for a few days, the patient made a recovery. Enormous quantities of fluid came away on the dressing, but no pus.

Dr. DUEL stated that in ten cases where he had had occasion to ligate the jugular vein, he had found that the glands along the course of the vein had been involved. He did not remember any case, among several others which he had seen operated by other surgeons, in which this fact did not hold true.

Dr. BERENS said that the lack of infection microscopically was a great surprise to him. A portion of the sheath of the vein was sent with the vein to the laboratory, and the whole specimen was examined and re-examined. After repeated examinations, the only report was that the intima was markedly swollen, with minute hemorrhages into the middle walls of the vein. The reason he ligated the vein was on account of the very unusual appearance which it presented; he had seen but one like it before. The vein was mottled, bulging; it appeared purple, with whitish blotches upon it, and dilated nutrient vessels of the vein passed through the blotches. There was evidently a phlebitis, but what kind of phlebitis was not known. The glands were not removed; a great deal of care was taken not to infect the wound in the neck; but in spite of this precaution there was a development of pus in two or three days. As regards the nervous phenomena, there was a crossing of the right eye to the left; but this was of very short duration, and at the time of its development there were a number of other nervous phenomena—extreme vertigo and dimmed vision, photophobia—altogether a very beautiful hysterical picture. This disappeared in a very few hours; it was followed by severe pain in the shoulder and in the side, which disappeared and had no connection apparently with the subsequent pleuro-pneumonia which she developed. There was distinct disease of the lateral sinus. There was no clot, but the fact

that there was disease of the sinus at the point of granulation tissue, sloughing so shortly, instead of healing as it should, proved that there was an infection at that point. He would not have gone into the sinus or into the vein, had not the tenderness in the neck been so great and the area on the sinus appeared to be diseased.

Dr. GUTTMAN read a report of **a fatal case of chronic suppurative otitis with cholesteatoma in the drum cavity and antrum, cellulitis of almost the entire scalp, thrombosis of the middle portion of the transverse sinus, cerebral abscess, and softening of the cerebellum**, which is printed in full on page 176.

Discussion. — Dr. WHITING, in commenting on the very interesting paper read by Dr. Guttman, thought that all who had had even a moderate experience with sinus thrombosis—whether the result of chronic suppuration or of acute suppuration—had a very pronounced respect for the thrombosis which has proceeded sufficiently far to cause well-defined and easily recognizable Griesinger symptom. The case which had been recounted was distinctly a cholesteatoma—whether the cholesteatomatous nature of the infection could be relied upon to produce a more virulent infection of the veins and lymphatics, was to him a question. In the seventeen cases on which he had operated, cholesteatoma was not found in a single instance. In those cases where the process was due to chronic suppuration, cholesteatoma was absent; nor was there in any of the cases cholesteatomatous material or epithelium which had undergone a metaplastic change and could be distinctly called a cholesteatoma. The chronic cases were without cholesteatoma, and the acute cases were those in which the infection in the majority of instances was streptococci—not pure, but streptococci and pneumococci mixed. He had never seen a case where the septic phlebitis had extended to the extent described by Dr. Guttman—involving all the veins in the occipital region, extending over the parietal region as far as the vertex. Whether or not the swelling which occurred in the eyelids was characteristic of the so-called Stirling symptom, was questionable—the swelling of the external or temporal half of the upper and lower lids and brow; the appearance of oedema in that situation is often called the Stirling symptom. That has been found, as a rule, where the clot has extended forward through the circular sinus into

the cavernous sinus. In this tremendous amount of cellulitis of the scalp, it seemed reasonable to suppose that the amount of swelling of the lid was largely due to the extension of the cellulitis. He questioned the wisdom of delaying the uncovering of the sinus instead of proceeding at the time of the first operation. There were evidently conditions present which were not accounted for in the mastoid process; he thought the doctor must have been satisfied, when he had thoroughly removed the cellular structure from the mastoid apophysis, that he not reached the cause of the trouble; simply a subperiosteal abscess and a destruction of the cellular structure of the bone would not account altogether for the symptoms the patient had exhibited up to the time of operation. It seemed to him that the doctor would have been justified in going on farther and investigating the interior of the skull. He found an opening in the roof of the antrum, and the dura was exposed, covered with granulation tissue; also, the dura pulsated. It seemed to him that the uncovering of that dura, with the presence of granulation tissue, would have warranted the doctor in pursuing farther. If he had done more, he would have found, as he did at the second operation, that he had a suppurating phlebitis; the parietal wall was disintegrated to a certain extent; he would have known that he had a sinus thrombosis to deal with, and his subsequent conduct of the case would have been more favorable for the preservation of the patient's life. Dr. Whiting had frequently found when operating for sinus thrombosis on patients who were in a critical condition, that intravenous saline infusions were of decided benefit, that with their help he had gone on and completed procedures which he was certain a few years ago he would have hesitated to undertake; the effect was marvellous. Continuing, he considered that having evacuated the subperiosteal accumulation of pus, having opened the mastoid and cleared out the cellular tissue, having found that there was a distinct mass of cholesteatoma, and that the bits of granulations were protruding, Dr. Guttman should have gone farther. He believed that if this had been done the prognosis for the patient would have been better than it was when the second operation was undertaken.

Dr. H. KNAPP, in discussing Dr. Guttman's report, said:

The objection Dr. Whiting makes to the management of Dr. Guttman's case is, in my opinion, well taken, but mitigated by the circumstances in which Dr. Guttman took charge of this

remarkable and desperate case. He saw the patient only a few hours before he had him brought to the hospital. After a short rest, the patient was operated on. When the ear and mastoid had been cleaned out, the patient was so feeble that it seemed advisable to let him have a night's rest. The same reason may also, in a measure, apply to the interruption of the surgical interference after the other operations.

In discussing this extremely severe case, I shall confine my remarks to two or three points: From the second day I was inclined to believe that a cerebral abscess was the starting-point of all the extra- and intra-cranial symptoms.

At the *incision of the fluctuating elevations of the scalp*, a thin, very offensive, purulent liquid gushed out. The outer surface of the bone was shining white, showing erosions and perforations. This, evidently first subdural, abscess pierced the dura, corroded and perforated the skull-cap in different places, causing the cellulitis calvariae. The lateral sinus was laid bare almost in its entire extent. It was filled with a septic thrombus of about 1½ inches in length toward the torcular, and the sigmoid portion contained fluid—normal-looking blood.

In two patients I have seen extracranial pus collections in that place—*i. e.*, midway between the torcular and the upper knee of the sigmoid sinus. In both patients the fluctuating swelling of the scalp was incised, yielding pus, and on sounding it the probe passed through a ragged perforation of the bone in the cranial cavity, liberating more pus, being arrested by a soft and membranous resistance—dura mater. I drained the cranial fistula in both cases with a perforated silver tube. The first patient died. The autopsy showed epicranial and subcranial collections of pus, cerebral abscess, and thrombosis. The case is published.¹

The other case was a strong-built negro, who had chronic suppurative otitis media. In the parietal region a fluctuating scalp swelling had formed. It was opened, pus was found, a probe penetrated through a small opening of the skull into the cranial cavity. A perforated silver tube was introduced, draining the intracranial suppuration (epidural, subdural, or cerebral abscess). The patient was in the hospital several weeks; he improved, lost fever; discharge a minimum. The patient left clandestinely, but reappeared two years later, having had no more trouble from ear and head.

¹ H. Knapp, "Three Serious Cases of Mastoid Disease; with Remarks," ARCHIVES OF OTOTOLOGY, xii., p. 44, etc., Case I, 1883.

I remember having read of cases of extracranial abscesses from epidural suppuration, in just the same place where the collections were found in my patients. This suggested to me the idea that this region, the middle of the transverse portion of the lateral sinus, behaved as a place of predilection for spontaneous perforations of the skull. Seeking an anatomical or pathological cause, I cannot account for this fact—if fact it be—in any other way than the preponderating frequency of otogenous abscess in the temporo-sphenoidal lobe.

Dr. LINN EMERSON cited a case on which he had operated a short time ago, in which the mastoid was involved. The case was almost in extremis at the time of operation; the sinus was found thrombosed, and the condition was so bad that any further procedure did not seem justifiable. Acting, however, on the advice of two much older physicians, who thought the operation should be completed, he ligated the vein. The patient never came out from the anæsthetic.

Dr. LEDERMAN, in speaking of the symptomatology, said that he had seen cases which were operated upon for mastoid complications, in which the symptoms did not improve after the operation, and indications pointed to cerebellar infection. In three fatal cases, which had come under his observation, he had been able to secure autopsies. In each of these cases, although the clinical aspect pointed to a temporo-sphenoidal abscess and there was disease of the attic, the autopsy showed lepto-meningitis. In another instance, the slow pulse and occasional rise in temperature, with pyæmic symptoms, went along for ten days after the mastoid operation was performed. The operator stated he had found disease of the attic at the mastoid operation. With this history, Dr. Lederman agreed with the diagnosis of the neurologist, as to the case being one of temporo-sphenoidal abscess. The brain was opened in this region and a knife plunged in four or five times, but no pus was found. The incisions were separated sufficiently to find it if there were an abscess in that locality. After this operation the patient felt decidedly improved. He got out of bed, and said he was ready to go home, when suddenly he became unconscious, and remained so for about four or five days. The neurologist then diagnosed cerebellar abscess. The doctor proceeded to remove the posterior portion of the bony structure, but by the time he reached the cerebellar region the patient was in extremis. The knife was

quickly plunged into the right hemisphere, and a large quantity of foul-smelling pus was found; but the patient did not recover. Dr. Lederman said that if he had a similar clinical experience he would not attempt to remove the bone posterior to the mastoid operation, but would immediately go for the cerebellar lobe; he thought valuable time was lost in attempting to chisel away when the patient was unconscious and where symptoms point to cerebral involvement. As regards the eye-grounds, he remembered an acute case where the mastoid was opened; there was acute suppuration. The symptoms improved very materially, except that at about the third week the patient developed a chill and a temperature. The eye-grounds were examined and nothing found. Although there was no part of the skull which was very tender—except one spot that the patient said was sore, posterior to the mastoid surface,—the patient was kept under observation. The blood was examined, malaria being suspected. The patient looked yellowish—septic in character. Plasmodia were found in the blood. Quinine was given him and the temperature lowered somewhat. The man was running a temperature of 103° – 104° and had two chills. On again opening the mastoid a drop of pus in the antrum was found—which was not sufficient, however, to account for the temperature and chills. An epidural abscess was finally discovered. The patient recovered. In another case, operated on for mastoiditis, the patient developed a very high temperature, 106° , with tenderness along the jugular. It was a question whether there was not a sinus thrombosis of the jugular to deal with. It proved to be an erysipelas. Under local application of ichthyol the patient recovered.

Dr. WHITING, in answering Dr. Knapp's statement that he was convinced that nothing would have made any difference in the result of Dr. Guttman's case, that it was necessarily a fatal one, said that although this was doubtless true, it was not the question—it was a question of principle. He cited a case of sinus thrombosis in which he resected the jugular and evacuated $4\frac{1}{2}$ oz. of pus from the temporo-sphenoidal lobe. The patient's heart could scarcely be heard with the stethoscope, but two quarts of saline solution were introduced into his veins, and he made an absolute and perfect recovery. Another point that was not brought out in the discussion, was the question as to which was the primary infection. It is well known that when there is an infection of this nature, where the antrum is filled with

pus, where there is an immense number of nutrient veins and an equally large number of lymphatics running in all directions from there, any number of lymphatics may have been infected at the same time, and the lymphatics may have carried an infection directly up into the temporal lobe. It seemed to him that with an infection of the character described it was likely that the abscess of the temporo-sphenoidal lobe was coincident with involvement of the sinus, and that the softening of the cerebellum was due to the infiltration of the infection through the visceral wall.

Dr. GUTTMAN admitted the advisability of a quick procedure, as suggested by Dr. Whiting, but said the case was not sufficiently clear when the operation was performed. The cellulitis was quite a complicated factor in the diagnosis. It was a question as to whether it was independent or in connection with the infection of the temporal bone. On the other hand, it might have been a subdural abscess. This was one of the reasons which made the delay of twenty-four hours seem best.

MEETING OF MARCH 10, 1904. DR. HERMAN KNAPP IN THE
CHAIR.

PRESENTATION OF CASES.

Dr. TOEPLITZ exhibited a case which he had operated upon for **sinus thrombosis** after acute otitis. The patient was first seen four weeks ago; there was a temperature of 107° , pulse 120, profuse discharge from the right ear. The patient's face was flushed, but he was conscious and did not feel extremely ill. The mastoid was not very sensitive on pressure, except over the antrum. The temperature had been high for about eight days, and two weeks before he first saw the patient he had the beginning of an acute otitis media with profuse running. A week later, he had a chill during the night, which lasted for about five minutes; he then had two more chills. He decided to operate at once, as he was convinced that there was a thrombosis of the lateral sinus. There had been temperature varying between 103° , 102° , and 107° . The antrum was entered and nothing but blood was found; the lateral sinus was exposed without difficulty, and was found to be covered with dirty-looking granulations. It did not pulsate. As the needle brought nothing, the knife was used to split it, and a thrombus was extracted; the sharp spoon used in a horizontal and downward direction was followed by free

hemorrhage. The sinus was plugged. The next day the temperature was 104° , the following day 103° , and on the third day 101° ; on the fourth day the temperature was normal, and has remained so ever since. The suppuration of the middle ear ceased after the operation. The patient remained in bed for ten days, and was then discharged from the hospital.

Discussion.—Dr. MYLES remarked that the case presented by Dr. Toeplitz seemed rather against the rule, but that the ear frequently surprised us when we chiselled into it under suspicious circumstances. He cited a similar case that he had seen last summer—a man forty years of age, who, in accordance with a physician's orders, had been exercising with dumb-bells. The ear was discharging from the posterior superior quadrant, and there was a suspicious tenderness and softness about the mastoid. The cortex was removed; large granulations were found growing from the lateral sinus, which, for its entire course, was bare. The sinus was opened; normal blood flowed out. The adhesions to the sinus walls around the margins of the opening in the bone were not disturbed. The patient made an uninterrupted recovery.

Dr. DENCH believed that the time to take these cases in hand was at their very beginning; that it was decidedly advisable to expose the lateral sinus in any suspicious case where there was a high temperature. He thought that in a case like that of Dr. Toeplitz's, where the temperature ranged from 107° , 106° , 104° , with discharge from the ear, with practically no tenderness over the mastoid, there was sufficient evidence for going into the mastoid at once, and not stopping there. He thought that where there was a high temperature in a case of this nature, the very fact that absolutely nothing was found in the mastoid should make one go a step farther and enter the sinus. He had seen a case where mastoid tenderness had existed but where it had been impossible to operate on account of pneumonia. The discharge from the ear had practically ceased, and yet when the bulb was exposed it was found full of pus. This shows that the cortex may be comparatively healthy, but that in a certain number of cases the disease will travel inward towards the cranial cavity. He urged that when there was any doubt as to the advisability of opening the sinus it should be opened. He had yet to meet with a single case of infection at the time of operation if the operation was conducted with proper aseptic precautions.

On the other hand, he had seen cases go wrong because, on exposing the sinus, it had seemed fairly normal and had been allowed to go unopened, with the result that, in a few days, there was a purulent clot. He again emphasized the fact that in every doubtful case the sinus should be opened, free hemorrhage established from above and below, and the sinus then plugged.

Dr. LEDERMAN told of a case which he has under observation at present—a young girl with acute suppurative otitis media, with mastoiditis. Both the patient and her sister had been operated upon by his assistant for the same disease. The one operated first progressed very favorably, but the second developed a temperature on the third day after the operation. Quite some disease was found in the cells, but no injury of the sinus occurred at the time of operation. In the first case, the sinus was injured, but no unpleasant results followed. The second case, in which the sinus was not wounded, and in which no disease of the sinus showed at the time of operation, has been running a very peculiar course, with an irregular temperature up to 105°–106° F. Dr. Lederman at first believed the symptoms to be due to a lateral-sinus or jugular thrombosis. A week after the mastoid operation, the wound was thoroughly cleaned and the sinus was opened to the extent of $\frac{1}{4}$ inch with the knife. This exploration was carried out, with the patient in bed, without an anæsthetic, as the sinus had been exposed for about an inch at the mastoid operation. There was no evidence of pus.

The temperature went down, then up again to 104°, and then down. It varied so much that it was thought there was, possibly, infection somewhere else. The case then assumed the appearance of typhoid: tremulous tongue, tenderness in the right iliac region, foul-smelling stools, tympanitis, with the temperature still going up and down. The patient had received four injections of anti-streptococcic serum, without any influence on the temperature or unpleasant results. The temperature is still high, although not quite so high as it was (103°).

Dr. Lederman thought that the jugular bulb was affected. He did not feel warranted in operating farther, however, as there are no headache, no changes in the eye-grounds, etc. There was but once a chilly sensation. The wound looks clean. The doctor did not think any other operation justifiable while the patient was improving. He believes that where there has been an inflammation of three weeks' standing, provided a thrombosis

exists, there would be other manifestations of a septic nature. There is no leucocytosis to speak about; the bacteriological examination shows some few streptococci and micrococci. No plasmodia were found in the blood, and a Widal test was negative.

Since the above remarks, the patient is gradually improving, without further surgical intervention; she has had intestinal antiseptics by the mouth, and rectal douching. The clinical aspect resembles a typhoid complication.

In speaking of the advisability of early operation in these cases, he recalled a case which had impressed him very forcibly. The patient had an acute inflammation of the middle ear and slight mastoid symptoms. The drum was incised, and the symptoms cleared up, but a week later the temperature rose and there was a slight chill. Plasmodia were found present. Injections of quinine were given, which brought the temperature down, but the patient complained of pain on the posterior surface of the mastoid. The eye-grounds were examined repeatedly, and when evidence of disturbed venous circulation appeared, we decided to open the mastoid. The superficial bony tissues appeared healthy, but there was a drop of pus in the antrum. The wound was about to be closed, when an epidural abscess was discovered, posterior to the antrum, containing from one-half to one teaspoonful of pus. The case had been going on for four or five weeks before indications for the opening of the mastoid presented themselves.

Dr. DELAVAN reported an **accident** which had occurred a few days ago with the **Chevalier-Jackson transilluminator lamp**. The instrument used had been recently obtained from a leading instrument-maker, and had been found to work satisfactorily. Desiring to demonstrate the maxillary sinuses of a patient, the doctor was about to introduce the lamp into the gentleman's mouth, when, without any particular reason, he tested the lamp once more. Instead of holding it in front of the patient's face, as one might be tempted to do, he turned it away and established the current, when the lamp exploded with a loud report. The explosion was heard in various parts of the house at considerable distance from the doctor's office. The lamp was shattered, and an intense burning took place at the socket of the lamp, which destroyed everything in its way—even the copper cap in which the lamp was secured being badly burned. The speaker thought it necessary to record the fact that the instrument under any cir-

cumstances could act as this one did. Undoubtedly, from the loudness of the report and the way the glass was shattered, the explosion was a violent one. The results would have been extremely disastrous if the lamp had exploded in the patient's mouth, both from the force of the explosion and the injury from the shattered glass, while the heat would have inflicted a severe burn. One of the objections to this instrument is the very considerable size of the lamp (8 candle-power). The street current is used, said to be modified by a little apparatus attached to the instrument. The latter is evidently insufficient to insure safety and the apparatus is unquestionably dangerous.

Dr. DENCH had had the same kind of lamp blow out twice, but never with any serious accident. In his own experience the fuse had always blown out in the plug, simply putting out a certain number of lights in the house. In each case it had short-circuited in the handle. He had happened to have weak safety fuses in the house, and it only blew them out, without bursting the lamp.

Dr. MYLES did not see the necessity of using lamps of such brilliancy; he thought a four-candle-power lamp was sufficient for any examination, that it would give all the light needed for any transillumination about the head; excessive illumination destroyed much of the delicacy of the tests.

Dr. LINN EMERSON asked if the plug had been taken apart to see if the fuses had been properly put in. [It had not.] He had found that many of the plugs had fuses that were too heavy; if short-circuited the fuses will go out; they should be light in weight. He had also found the "repair man" guilty of putting in copper wire. If properly fused he did not think the short circuit would burn out the lamp.

Dr. EMERSON related a case of **foreign body in the auditory canal** of a patient now fifteen years old, who, six years ago, when a child nine years of age, while playing on the beach at Asbury Park had put a pebble in her ear, hurriedly notifying her aunt of the fact, who rather laughed at the child and decided that it was imagination on her part. At frequent intervals since, the patient insisted that the pebble was in her ear. About two weeks ago, she developed pain and deafness; the deafness was absolute for a watch—she could not hear it except on contact. On examination, the pebble (which Dr. Emerson exhibited to the Section) was found. It was discovered by a member of the family

who put a hair-pin in the ear. It was tight against the drum and had injured the canal. After two or three manipulations with different-shaped foreign body hooks, without accomplishing anything, the doctor was about to give it up, when he thought of using sealing wax on a cotton-tipped probe. After four attempts he succeeded in withdrawing the stone. Immediately afterwards the child could hear a watch at a distance of 36", and four days later was entirely well. Dr. Emerson said that he did not know what the experience of others had been, but his was that it was not so easy as he had supposed it to be.

The lamp must be held close to the ear of the child, or the wax would get cold before he could get it in contact with the foreign body. The hot wax in the canal was also very painful to the patient.

Dr. LEDERMAN cited an experience he had had with a pebble not long ago. Two or three attempts had been made to remove the stone before the case presented itself to him. When he saw the patient there was a mass of granulation tissue around the foreign body; the foreign body could be felt with a probe, but it could not be seen. The pebble had been lying there probably two months, and had imbedded itself in the posterior wall, and had been forced through the drum. When the auricle was pushed forward, after being freed from its posterior attachment by the usual mastoid incision, close to the fold, he was enabled, by putting in a curette, to gradually work out the pebble. The suppuration cleared up and there was a complete recovery. It was a case of too much manipulation; if the tissues of the canal are wounded, swelling, infection, and granulations are apt to form, and such an operation has to be performed to remove the foreign body.

Dr. EMERSON remarked that the reason he did not make any further attempt to remove the pebble with the foreign-body hook was because when he advised giving the patient an anæsthetic, so that he might remove the pebble, consent to do so was refused by the child's mother.

Dr. HOLMES reported a case where a family physician had attempted to remove a green glass bead a little larger than the pebble which had been shown, and in his efforts to get it with a pair of forceps, the physician had pursued the bead until it had ruptured the memb. tymp. and had been forced into the middle ear. It was necessary to give the child an anæsthetic. The

attempted removal being only a few hours before the patient was seen, there was but little swelling of the canal, and under anæsthesia Dr. Holmes readily removed the bead from the middle ear, where it had lodged.

In speaking of an examination he had made at the Jacksonville (Ill.) Institution for Deaf-Mutes, Dr. Holmes stated that among the children was a girl who was not absolutely deaf, but whose hearing was not sufficiently good to admit of her attending public school. The hearing in one ear had been totally lost during infancy. Upon examining this child, the doctor found the external canal of the hearing ear very firmly closed by a locust bean. The girl was fourteen or fifteen years of age, and the history given was that the bean had been in there for five or six years. The patient had always maintained that there was something in the ear, but had not been believed. Dr. Holmes succeeded in splitting the bean with a sharp knife, and then extracted the pieces. Notwithstanding the length of time it had been imbedded there, the drum had not been affected, and the canal was practically not inflamed. Hearing was considerably improved after removal of the foreign body—pathological changes the result of former inflammation precluding the possibility of complete restoration.

Dr. DENCH was reminded of a case at the Infirmary years ago, in which there was a watermelon seed in the ear. It was deep in the canal, well against the drum-membrane. Under anæsthesia the doctor mined out the entire interior of the seed, and by means of the curette was able to pull the thin shell out.

Dr. HARRIS read a report of **a case of combined acute otitis media and otitis externa, with some unusual symptoms.**

Mrs. S., a Jewess, aged fifty-three, was seen by me on February 7th, on account of pain in the left ear, which had then existed one week without treatment. Examination of the ear at that visit showed a moderate degree of bulging of the membrana tympani. There was no swelling or tenderness on pressure over the auricle or in the auditory canal, but over an area corresponding to the left temporo-sphenoidal lobe severe pain was complained of, especially at one point—also at the condyle articulation in front of the ear. The pain in the ear had ceased at the time of my visit. There was no pain in the teeth or jaw, though the condition of the teeth was bad. Temperature normal. Pulse slightly accelerated. Patient did not suggest a hysterical subject.

She had never had trouble from her ear, but had recently recovered from an attack of sickness described as rheumatism. I learned that there had been a slight discharge from the ear three days previous. A paracentesis of the drum membrane was performed by me and hot douching to ear ordered. As an ice-bag had been used previous to my visit, I ordered it discontinued, and substituted hot poultices in front of the ear. There were no mastoid symptoms. Examination of discharge from ear after paracentesis showed no streptococci, but the diplococcus intercellularis. This visit was on Sunday. The next day she was slightly better, some pain in the ear and head. Tuesday the pain was intense in both ear and head. Discharge from ear scant; no bulging of the drum. The pain outside of ear was limited to one point in front of ear and one above and anterior, both acutely sensitive to touch. I could not believe that the condition was deep-seated, but was reminded forcibly of a case I reported to this Section two years ago, where the symptoms were not dissimilar: This was a young man in good health, with no previous ear trouble, whom I saw on the second day of his illness. He complained of excessive pain in the ear. The membrana tympani was only slightly bulging. A paracentesis was promptly performed. Temperature and pulse and mind normal. Nothing relieved the pain. A mastoid operation was performed on the fourth day, without revealing pus or diseased bone; later, the cranial cavity was explored. He died the eighth day of a leptomeningitis. For several days his temperature remained perfectly normal. Feeling that there was possibly some constitutional factor, I ordered, in the present case, full doses of salicylic acid, later adding iodide of potash, and locally applying blisters over the sensitive area. This had no appreciable effect—only morphine gave any relief. There was now a slight elevation of temperature. From Tuesday to Saturday the condition did not change. On Saturday, the sixth day, I discovered for the first time a swelling of the cartilaginous portion of the auditory canal, completely hiding all view of the drum membrane. The case was seen on the afternoon of this day, in consultation, by Dr. Wendell C. Phillips.

By this time, eight hours later than my morning visit, the swelling of the canal had disappeared. Tenderness on deep pressure over the antrum was elicited. An ice coil was applied to the mastoid, and internally Warburg's tincture was ordered.

Examination of blood and eye fundus negative. The following morning the deep swelling of the canal had recurred, with increase of the pain in the head. An incision down to the bone was accordingly made in the anterior wall. The relief to the pain was marked and immediate. Tenderness over mastoid antrum seemed, however, increased. The day following, this also was better; forty-eight hours after the incision into the canal, the pain and swelling recurred, and a second incision was made with equally beneficial result. At this time, or a week after the first visit, she first complained of pain in the roots of the decayed teeth of the lower jaw. This has persisted at intervals since then. When it becomes particularly severe, pain will be experienced in the head, or even in the ear; all tenderness, however, over the parietal bone has long since disappeared. The discharge, too, from the middle ear has virtually ceased, and the patient is convalescent.

The association of pain in the teeth, in the auditory canal, and in the scalp and head clearly shows an involvement by pressure of the several branches of the trigeminal. As you will recall, the inferior maxillary branch sends a large trunk, the inferior dental, to the lower jaw, and a temporo-auricular branch to supply the outer ear and the auditory canal. This afterwards proceeds near the temporal artery up in front of the ear, to lose itself on the side of the head. A neuralgic condition of these terminal branches would seem to account for the areas of excessive sensitiveness in this region. While this is evident now, the absence of all dental pain and all swelling and tenderness in the canal during the early days of the illness served to greatly obscure the diagnosis and to suggest the possibility of some deeper-seated meningeal trouble—the result of the middle-ear suppuration, as in the other case just referred to.

Discussion.—Dr. LEDERMAN reported a case which he saw last week, which demonstrated how difficult it is with these cases of external otitis, especially those associated with infectious diseases, to make a diagnosis.

The case was that of a woman of seventy years, whose family physician had been treating her for an existing acute bronchitis. She complained of pain back of the right ear, but it was exceedingly difficult to get any inspection of the drum; the calibre of the canal was so encroached upon by a bulging of the posterior meatal wall that the drum could scarcely be seen. The anterior

quadrant looked pale, the posterior portion seemed a little pinkish, but not bulging. The mastoid was œdematous and pitted deeply, and there was distinct pain over the tip and emissary vein. It was a question as to whether the case was not one of a quiescent chronic suppuration with mastoiditis. There was sour, rather foul-smelling secretion removed on the cotton-wrapped applicator. There was no history of previous suppurative ear disease. The patient complained of headache and pain on one side of the head; temperature was $103\frac{1}{4}^{\circ}$. There was a history of eczema of the auricle. The doctor inquired if she had been scratching, but a negative answer was given. The auricle was swollen, reddened, and perichondritis existed. She gave a history of having had attacks of erysipelas in years gone by. Ichthyol was applied, plus the ice-bag. The temperature stayed up for three days, when finally the swelling of the ear subsided; but it went to the other ear. The diagnosis of an erysipelatous cellulitis was then more positive. There was no discharge at any time, and the tenderness has disappeared. Dr. Lederman spoke of the difficulty in arriving at a proper diagnosis in such cases. He thought that if the patient had been a hospital case, she would have been operated upon for mastoiditis.

Dr. JORDAN read a paper entitled "Report of a Fatal Case of Multiple Otitic Abscesses in the Temporal Lobe, with Remarks," which is printed in full on page 186.

Discussion.—Dr. McKERNON said that the case reported by Dr. Jordan reminded him of one he had seen four years ago, which was reported in the New York Otological Society—that of a boy sixteen years of age. For nine years previous to his admission a purulent discharge had been present. Preparations were being made for operation, when the house surgeon reported that respiration had ceased and the boy was practically dead. It was found that the respiration had ceased, but that the heart was beating very distinctly, the pulse running regularly about 160. The case had then been in the hospital for about two hours. Respiration was not re-established except by artificial means, and then it would immediately stop. The patient died soon after artificial respiration had ceased some half an hour. At the autopsy, a condition somewhat similar to that in the case reported by Dr. Jordan was found present. In the posterior part of the temporosphenoidal lobe was a large abscess, the tissue being all soft and broken down; and inferior to this, down in the cerebellum, was

found a second abscess with no apparent communication with the first; there were hemorrhagic conditions in the fourth ventricle and also in the region of the pons. Because of the inability of the patient's friends to speak English, no distinct history could be obtained, and for some time it could not be ascertained where the boy had been brought from.

Dr. MCKERNON also spoke of another case, on which he had operated two years ago, the patient being a lad of about thirteen years of age. There were no definite symptoms, except occasional attacks of vomiting. He had had a purulent discharge from the ears for several years. At the end of two days it was decided to operate; the boy was chloroformed and the doctor went in above the tegmen. The dura was very much darkened. As soon as the bone over the dura was removed, the dura bulged somewhat. The scalpel was thrust in well anterior. It was followed by only a few drops of blood. It was passed in an upward direction for about one inch. This was rewarded by the oozing of pus from the abscess cavity. The area of the dura was enlarged, the finger inserted, and about $\frac{1}{2}$ oz. of pus was evacuated from the abscess cavity. Thinking that he had evacuated all the pus in the cavity, the doctor at that time decided to use the encephaloscope. It was passed into the cavity, where it met with normal-looking brain tissue—except for a slight congestive area. In turning the encephaloscope upwards and inwards, a little darkened space in the brain tissue was perceived. This was punctured and about $\frac{1}{2}$ oz. of pus evacuated. He believed that without the use of the encephaloscope this second abscess would have been missed. The case made a very good recovery. He agreed with Dr. Jordan as to the advisability of doing both the radical or the mastoid operation and the operation on the brain at the same time, if there were definite symptoms to go by. Sometimes, however, the symptoms are not at all definite—in which case, we must simply wait until the symptoms do develop, before we can go on. With reference to the mode of entering the skull, he thought the most preferable means to obtain free drainage was to enter the floor of the lobe as low down as possible. He thought Dr. Jordan's paper particularly instructive, by reason of the fact that it dealt with a case that showed no early definite symptoms except the retention of pus in the antrum.

Dr. DENCH called attention to one or two points in Dr. Jordan's

paper, one being the change of drainage from the gauze which he first put in the wound, to a tube. He had operated upon quite a number of cases of this character, but had been able to save only a very few. He had used all sorts of drainage, and at one time had considered that the kind of drainage used made a considerable difference in the result, although now he believed it depended almost solely on the thoroughness of the operation. He referred to one case which had been under his care, in which he thought the drainage did have something to do with it. There was a temporo-sphenoidal abscess. He found three distinct communicating abscesses. The retention of pus in the separate abscesses was characterized by well-marked symptoms—a rise of temperature and an increase in the cerebral symptoms. In this case, the secondary abscesses which communicated with the main cavity were opened by the examining finger. The finger detected a small passage, and the removal of the finger simply evacuated a considerable amount of pus. There, the gauze drainage did not seem to work so well as the tubes—one large and one small tube, irrigating through the smaller and allowing the return current to flow through the larger tube. The chief thing is to keep the cavity thoroughly clean; he did not think the particular form of drainage made much difference.

One difficulty he had encountered in cases of cerebral abscess had been the appearance of hernia. He believed that one case had been lost on account of a subsequent infection of the pia mater, on account of the large exposure of brain substance. In order to drain an abscess of this kind, he advised making a pretty good-sized dural flap, and after evacuating the abscess to suture the dura, leaving a moderately small opening around the tubes, packing about the tubes with gauze to prevent infection of the pia mater. The doctor was interested to learn, through Dr. Jordan's paper, that there had been a temporarily beneficial effect from lumbar puncture. It occurred to him, he said, that when we have an opening in the cranial cavity it would be a good plan, if no abscess were found, to simply open the lateral ventricles and relieve intracranial pressure in that way. After examining the specimens which Dr. Jordan submitted, Dr. Dench was particularly impressed with the statement made that the abscess was just developing; if it had gone on a few days longer there would have been present an abscess inside of the encephalon. He then

cited a case, occurring in his service of the New York Eye and Ear Infirmary, which had been operated upon about one year ago by Dr. Brandegee, which the latter had reported to the Section. The case came into the hospital suffering apparently from a simple mastoiditis. It was operated upon by Dr. Brandegee, and did very well for a few days, until one day the house surgeon said that the probe went beyond the limits of the antrum. It went, apparently, through the dura. The opening in the dura was exposed and a free incision made through the dura. There was simply a small amount of softened brain tissue evacuated. The cavity was wiped out and packed with gauze; the temperature, which had been 104°, dropped to somewhere about 102°. The case made an uninterrupted recovery, and is alive at the present time.

He believed that early exploratory operation was indicated in all obscure cases, and laid especial stress upon the fact that in a number of cases of intracranial infection, secondary to a purulent inflammation of the middle ear, exploratory operation simply revealed a beginning acute cerebritis, as characterized by a softening of the brain substance in the neighborhood of the tegmen tympani. In addition to this softening, there occurred in most of these cases well-marked signs of increased intracerebral pressure, as evidenced by the immediate bulging of the brain substance through the wound as soon as the dura was incised. This intracerebral pressure was due, in most cases, to an accumulation of serous fluid within the ventricles; it was also partially due to an œdema of the brain substance itself. It seemed possible that early puncture of the lateral ventricle and free incision through the œdematous brain substance might relieve some of these cases. At the present date, however, he had had no success from this method of treatment.

Dr. HOLMES related a case of particular interest, one in which he sent his assistant a hundred miles to secure the brain, so as to have a complete history: A medical student, twenty-five years of age, had suffered from an otitis in the right ear seven years ago, with periods of intermission when the ear was apparently dry and free from any trouble. One day his room-mate reported to the doctor that Mr. X. was in bed, where for two days he had been suffering with terrible pains in his right ear. Upon examination the doctor found the memb. tymp. injected, a slight amount of purulent secretion exuding through an old perforation, and

tenderness over the mastoid, but no swelling; slight elevation of temperature. The patient was put to bed in the hospital, received local and general treatment, and in five days the active symptoms had quieted down. At his urgent request he was permitted to go to his own room, but advised that a radical mastoid operation should be performed at an early date; he, however, flatly refused to entertain the suggestion. The eyes were examined and discs found normal. Four days later, his room-mate again reported the patient suffering from intense earache, but instead of returning to the hospital he had packed his trunk and started for home a journey of about one hundred miles. Nothing more was heard of him for some time, when it was learned that he had become very ill on the train, was unable to sit up, and the conductor had been obliged to telegraph his parents to meet him. He steadily refused to submit to an operation, stating that he would sooner die. About four weeks afterwards the doctor received a request to go at once and operate on the patient. The symptoms as described over the telephone pointed to cerebral complications in a very severe form. On examining the young man, he found the pupils contracted, sluggish, and marked optic neuritis present in both eyes; the reflexes were normal; temperature 103° , and the mental faculties slightly cloudy. He was prepared for operation, and a peculiar feature during the anæsthesia was that the right pupil remained widely dilated throughout the whole of the operation, while the left was normal. Broken-down tissue was discovered; the lateral sinus seemed to be normal. The tegmen was removed and an abscess was discovered in the temporal lobe. About one-half ounce of pus was evacuated. Dr. Holmes did not feel justified in going farther, and, after packing and dressing the wound, the patient was put to bed, the doctor returning to his home. The patient appeared slightly improved for a day or two, when the symptoms increased and he received another summons. Another operation was performed. The young man was again placed on the table and an opening was made in the squamous portion, where another abscess was found, higher up but in very close proximity to the first. A half-ounce of thick pus was evacuated and communication established with the lower abscess cavity, so as to secure free drainage. The patient died about three days afterwards, and, as stated, Dr. Holmes sent his assistant for the brain. As soon as it arrived, the examination was made at once. In addition to the first and second abscess

cavities already described, there was another abscess, about the size of a hazel-nut, on the convexity near the longitudinal sinus, but no general meningitis.

Dr. H. KNAPP said that he had had the privilege of watching Dr. Jordan's patient, who, when he presented himself for operation, had an optic neuritis. He was operated upon, and in the next three or four days he seemed to be very much better and the optic neuritis was less marked. Then he suffered a relapse. He was comatose; in about ten days he died. At the post-mortem, it was seen that in the swollen, diseased hemisphere there was a diffuse purulent encephalitis with subarachnoidal collections of pus between the convolutions. This case confirmed the opinion held by Dr. Knapp—that the openings which are made from the mastoid and also from the middle ear are apt to be insufficient, although they are of advantage in finding a fistula leading to the abscess; they are apt to produce a temporary improvement, followed soon by a relapse. Dr. Knapp referred to the time when operations for brain abscesses were scarce, and cited a case on which he had successfully operated eleven years ago. The girl was of consumptive parents, with chronic suppuration of the ear for three or four years. Gradually she developed cerebral symptoms with hemianopsia. The diagnosis, abscess in the temporal lobe, was endorsed by Dr. Starr. The skull was opened by a trephine crown of 3cm in diameter. Pus immediately was struck by a large hypodermic syringe. The recovery was favorable the first weeks, although a hernia the size of a hen's egg developed. There was no infection, however, but she again began to have fever, and the hernia, which had begun to recede, became larger and bulged out on one side. An incision elicited another abscess. From that time, the child made an uninterrupted recovery, and has been well ever since.

Dr. Knapp said that it was now generally held that too small an opening was one of the greatest mistakes in the treatment of abscess. Also, that we must be prepared for secondary abscesses, since they certainly exist in a goodly number of cases. He did not know whether it was possible to make at once a large enough opening in cases where multiple abscesses existed, and he did not believe that this case of Dr. Jordan's could have been saved, because there was a diffuse encephalitis, but he thought that we should think of another abscess, when the improvement after the first operation was followed by cerebral symptoms again, and

then we should act according to the new indications—enlarge the tympano-mastoid opening, or make a new opening through the squamous portion.

Dr. KRUG reported a case upon which Dr. Gruening had operated some five years ago, the son of a physician. There was a temporo-sphenoidal abscess on the right side. After the operation the child was perfectly well for about five years. Four weeks ago it was brought to the doctor with a very profuse, clear serous discharge from the right ear. Examination of the ear showed a mass bulging into the external canal, which pitted slightly on pressure with the probe. About five days after this, Dr. Gruening was called up by the boy's father and told that the child had developed brain symptoms. The patient was sent to the hospital, where he developed meningitis. A culture was taken of the spinal fluid, and active streptococci found. The boy went into a coma. On the suggestion of Dr. Manges, one of the visiting physicians, a spinal injection of 10cc of a solution of lysol was advised, and made, 10cc of spinal fluid having been first withdrawn. The boy immediately showed signs of improvement. Culture was again taken, and streptococci were still active, but considerably less than before. On the following day the temperature dropped, the patient improved and has now recovered.

Dr. McKERNON said that in the past year he had had cases of encephalitis in which he did exactly what Dr. Dench hoped would be done in the future—excised the brain substance. In one of the cases he did a very thorough curetting. There, he used the scissors very freely in getting into the brain substance, cutting off all the discolored and disintegrated brain tissue. Even though there was no meningitis present, it did not seem to have the slightest effect to stay the process.

Dr. JORDAN concluded by saying, that the only regret he had as regarded his conduct of the case reported, was that he had not used the Whiting encephaloscope. From what he had learned, he believed the instrument should be used to find multiple abscesses. In the case referred to, he made so many incisions into the brain that he was sure there was no large abscess. He considered that it was a case of progressive encephalitis, with very little chance at any time for its recovery. He thought, however, that perhaps, if the encephaloscope had been used, more pus might have been obtained and the progress of the encephalitis checked.

REPORT ON THE PROGRESS IN OTOTOLOGY DURING THE SECOND QUARTER OF THE YEAR 1903.

BY DR. ARTHUR HARTMANN.

Translated by Dr. ARNOLD KNAPP.

(Continued from page 171.)

NOSE AND NASO-PHARYNX.

a.—GENERAL.

193. **Felix.** The bacteria of the normal nasal cavity. *Wien. med. Wochenschr.*, Nos. 14 and 15, 1903.

194. **Moeller.** Remarks on the lateral adenoid vegetations in the nasopharynx, with a description of a new set of instruments for their removal. *A. f. O.*, vol. lvii., p. 178.

195. **Uffenorde.** On the histology of the hyperplastic pharyngeal tonsil, with regard to tuberculosis and indications for operation. *A. f. O.*, vol. lviii., p. 47.

196. **Ziller.** The relations of pharyngeal tonsillar hypertrophies to the palate, skull, face, and nose. *Inaug. Dissert.*, Breslau.

197. **Potapow.** The third tonsil in sucklings. *Wratschebnaja Gaseta*, No. 15, 1903.

198. **Kantorowitsch.** A case of enuresis healed after removal of adenoid vegetations. *Prakt. Wratsch*, No. 40, 1902.

199. **Viollet.** On the histological structure of adenoids. *Four. de l'anat. et de physiologie*, 1903, p. 97.

200. **Fischer.** The symptoms produced by adenoid vegetations, their consequences and complications. *Ugeskrift for Lager*, No. 17, 1903.

201. **Calamido and Bitelli.** On respiration of the frontal sinus in man. *Archiv. ital. di otologia*, vol. xiv., No. 2.

193. A survey of the literature on the subject without bringing out any new facts.

WANNER.

194. A frequent cause for an unsuccessful result after the adenoid operation is furnished by the vegetations situated

laterally — usually in Rosenmueller's fossa, though sometimes farther down the lateral wall on the tubal ridge or behind the plica salpingopharyngea. In two hundred cases these were found present in nine. The symptoms resemble those of ordinary adenoids. The diagnosis is usually made by digital examination, though sometimes it is only possible to do so after removal of the mass. For their removal, a special instrument, devised by Professor Mygind, is recommended, which resembles Kirstein's knife, but with a lateral deviation of the handle. HAENEL.

195. The author has not been able to verify Trautmann's statement that the soft form of adenoids is the more vascular. He was not able to find a connection between the soft form and tuberculosis, nor a relation of the various consistencies of the pharyngeal tonsil to various ages. As against other authors, the writer found the enlargement of the tonsil in two cases out of sixty-four to consist of a hyperplasia of the submucosa, and especially of the glandular elements. In general, the hyperplastic process is found in the *substantia propria*.

The cysts in the pharyngeal tonsil are described, and also tuberculosis of the pharyngeal tonsil, which was found present microscopically in three of sixty-four cases. In two, a few tubercle bacilli, situated in giant cells, were found present. In all three cases, after extirpation of the tonsil, the tuberculin test was made, twice with negative and once with positive result. The different results from the tuberculin reaction correspond to a different histological condition in the extirpated tonsil. In two cases with negative reaction, the tuberculosis changes were limited to the *substantia propria*. In the third case, the sub-mucosa was found tubercular. In the first two cases, the tuberculous focus was removed out of the body by operation, while in the latter case other tubercular manifestations remained. In this case, according to the author, the pharyngeal tonsil was the primary focus. The tuberculin test is of great diagnostic value to show whether the tuberculous infection was localized in the extirpated tonsil or was already disseminated. He recommends that every extirpated tonsil should be examined microscopically for tuberculosis, and, if possible, then the tuberculin test should be tried. In each case, the indication for operative removal of adenoid vegetations should be increased, so that cases are operated upon, not so much on account of severe symptoms, but from the possibility of tuberculosis changes being present. HAENEL.

196. In order to obtain serviceable results, it is necessary to undertake similar measurements and to examine in various ages. Ethnological peculiarities can explain the divergence of the results of various investigators. The tendency to enlarged pharyngeal tonsil is often inherited: in one family, for instance, there were five brothers and sisters; in another, a father and five children were attacked. Hypsistaphylia is not a necessary sequence of a pharyngeal enlargement or the consecutive interference with nasal respiration. It is, however, more frequent in this disease than when the breathing is normal. Hypsistaphylia is not always associated with dolichocephalia, leptoprosopia, or leptorrhina, and a uniform coincidence of the two last forms does not always exist.

HOELSCHER.

197. An examination of one hundred cases has led the author to conclude that disturbance in drinking and swallowing and dyspepsia in sucklings are frequently caused by hypertrophy of the pharyngeal tonsil. Examination is only possible by anterior rhinoscopy. He does not operate before the fifth month. These children stand cocaine very well. After-hemorrhages have not been observed. The first symptoms of rachitis often disappeared after the removal of adenoid vegetations, together with the dyspepsia.

SACHER.

198. The removal of the adenoids in a boy twelve years of age caused a prompt healing of the malady which had existed for six years.

SACHER.

199. Pharyngeal tonsils which recur have not always the usual appearance, but present a raspberry granulation surface. This form has been carefully examined microscopically. The periphtric part consisted of adenoid tissue, the central of vascular connective-tissue; the eosinophile cells were unusually numerous, uniformly distributed throughout the entire tonsil, while Mastzellen were only found in the central part. It cannot be stated at present whether the eosinophile cells are formed in the tonsil or emigrate out of the blood.

OPPIKOEFER.

200. The material examined consisted of 500 cases from the clinic of the Kommunal Hospital in Copenhagen from March, 1899, to January, 1902. Most of the patients were between seven and nine years of age, only a few were over twenty. The symptoms produced by occlusion of the naso-pharynx were as follows: Nasal stenosis, anosmia, and rhinolalia clausa, catarrh of the respiratory

passages, aural affection, but not the distinct symptoms—enuresis, headache, disturbance of speech, etc. Nasal stenosis was present in 84 of the cases, anosmia in 27, rhinolalia clausa in 80; acute and chronic catarrh was very frequently present. Laryngeal stenosis was frequently combined with adenoid vegetations, and appeared to stand in some etiological connection. Ear symptoms were present in 66 % of the cases; chronic purulent otitis in 6.4 %; sequelæ were present in 4.6 %. According to the histories, a much larger proportion of cases of aural suppuration were present, namely, 20 %.

JOERGEN MOELLER.

201. In a patient where the anterior wall of the frontal sinus was open, following traumatic fracture, the authors investigated the respiratory changes in this sinus. From these experiments, they conclude that the air in the frontal sinus takes part in each case in nasal respiration.

RIMINI.

b.—METHODS OF EXAMINATION AND TREATMENT.

202. **Hirschmann.** Endoscopy of the nose and of the accessory cavities. A new method of examination. *Arch. f. Laryng.*, vol. xiv., No. 2.

203. **De Stella.** Some notes on the employment of adrenalin and on its physiologic action. *La Presse otolaryngologique Belge*, 1903, No. 5.

204. **Mignon.** A new method of applying adrenalin in rhinology. *Arch. internat. d'otol.*, etc., 1903, pp. 361-363.

205. **Strubell.** On yohimbin as anæsthetic. *Wiener klinische Wochenschrift*, 1903, No. 24.

206. **Menzel.** On treatment of respiratory closure of the alæ nasi. *Munch. med. Woch.*, 1903, No. 18.

207. **Walsham.** On some operations for rectifying crooked and depressed noses. *Lancet*, April 4, 1903.

208. **Tilley.** A case illustrating an operative procedure for the relief of almost complete adhesion of the soft palate to the posterior pharyngeal wall—the result of tertiary syphilis. *Proc. Laryng. Society*, March 6, 1903.

209. **Gamlen.** Treatment of lupus by X-rays and ultra-violet rays. *Brit. Med. Journ.*, June 5, 1903.

210. **Sequeira.** Further observations upon the treatment of rodent ulcers by X-rays. *Brit. Med. Journ.*, June 5, 1903.

211. **Ingals.** Clamp forceps for removal of naso-pharyngeal tumors. *Journ. Amer. Med. Assoc.*, June 6, 1903.

212. **Monosmith.** A new nasal speculum. *Journ. Amer. Med. Assoc.*, April 4, 1903.

213. **Douglass.** Septal fallacies. *The Laryngoscope*, April, 1903.

202. In order to examine the cavity of the maxillary antrum, the author has modified Nitze's cystoscope, so that it can be introduced through the ordinary opening in the alveoli. After

experiments on twenty-one patients, the author believes that endoscopy is of great diagnostic importance, and describes a number of conditions which he found present. **BRUEHL.**

203. (1) Adrenalin increases vascular pressure only after intravenous injection.

(2) Absorption from the mucous membrane is too weak and too slow to produce a general effect upon the vascular pressure.

(3) Injection underneath the skin or mucous membrane has only local action on the vaso-constrictors.

(4) Consequently, a result cannot be expected in the case of hemorrhages whose source cannot be reached (pulmonary hemorrhages). **BRANDT.**

204. 0.03 adrenalin (1: 1000) is first mixed with 3.0 vaseline oil, and then 12.0 white vaseline, 3 drops oil of geranium, and 15.0 of lanolin are added. This salve is rubbed into the mucous membrane with a cotton applicator. The astringent appears somewhat less quickly, but remains considerably longer than after the application of the ordinary adrenalin solution, and the consecutive dilatation of the vessels is avoided. This is recommended in acute rhinitis, in secretoria rhinitis, and after cauterization of the mucous membrane. Hemorrhages are less frequent when this has been used in operations on the nose.

OPPIKOFEK.

205. The experiments were made on healthy and diseased persons. With yohimbin, paralysis of sensation occurs with hyperæmia—so that the turbinates did not decrease in size. The author, therefore thinks this drug is indicated in operations on the lower and middle turbinates. In general, two to three applications of a 1 % solution sufficed to produce tactile anæsthesia in the mucous membrane of the nose, pharynx, larynx, and mouth, though the action does not appear to go deep. A 1 % solution is not sufficient for the electro-cautery, and the drug is therefore only to be used for a cold snare. In the twenty cases observed by the author, severe hemorrhage did not occur either during or after the operation; the agent had no deleterious effect.

WANNER.

206. During this aspiration of the alæ nasi, paraffin was injected in the outer wall of the nose, with satisfactory results in two cases. **SCHEIBE.**

207. **WALSHAM** describes the following operations:

1. Forcible straightening.
2. Subcutaneous osteotomy along the naso-maxillary.
3. Subcutaneous suture of the nasal cartilages.
4. Wiring the cartilage to the nasal bones.
5. Injection of paraffin subcutaneously.
6. Shifting the septum bodily at its junction with the floor of the nose.
7. Formation of a septum from the maxillary crest.

ARTHUR CHEATLE.

208. The patient had been twice operated upon before coming to TILLEY, who, after separating the soft palate from the pharyngeal wall, passed a strong silver wire from before backwards, through the soft palate, close to its junction with the hard palate, and about half an inch from the middle line. The distal end was then made to repierce the soft palate close to its fore margin, and from behind forwards. The free ends were then brought forward, exerting firm traction on the soft palate, and fastened round an incisor tooth. A similar procedure was then adopted on the other side of the palate. One wire cut out in about ten days, the other in a fortnight. The house surgeon for three weeks had passed his finger into the naso-pharynx and exerted firm traction forwards upon the soft palate.

ARTHUR CHEATLE.

209. This is a long paper, giving details of technique and the results in cases of lupus of the nose. The paper is illustrated.

ARTHUR CHEATLE.

210. SEQUEIRA has treated over one hundred cases. In his paper he deals with: the changes produced in the growth; the question of recurrence; the selection of cases and the conditions which favor success. Two excellent results of rodent ulcer of the nose are recorded.

ARTHUR CHEATLE.

211. The naso-pharyngeal clamp forceps has the general form of Loewenberg's, or rather Michael's forceps, since the blades are longer and much more curved than in the former. The curved portion is two inches long, each blade is protected at the back and outer side by a piece of ivory to avoid the production of a short circuit in using the galvano-cautery snare, and the roughened faces of the blades are each provided with four short, sharp spikes to prevent slipping. The handles can be locked.

M. TOEPLITZ.

212. The instrument is to be held in the left hand for both nares, with the ball of the thumb on the screw head, whereby the blades open vertically, raising the tip of the nose without touching the mucous membrane. The upper blade is much shorter and is placed somewhat back of the lower blade; it is also hooked slightly upward. The blades are attached to the shanks at right angles. M. TOEPLITZ.

213. DOUGLASS advises against breaking the septum into minute fragments with the forceps, as heretofore practised in straightening operations, and instead to separate the triangular cartilage. There is no danger of setting up a meningitis. A single incision is preferable to a crucial one. In all cases the superior maxillary spine should be broken, which is done by chisel either through the upper lip or through the nose.

M. TOEPLITZ.

C.—TUMORS OF THE NOSE.

214. **Baber.** A case of tumor of the vestibule of the nose. *Proc. Laryng. Society*, March 6, 1903.

215. **O'Kinealy.** Microscopic section of localized psorospermiosis of the mucous membrane of the septum nasi. *Proc. Laryng. Society*, April 3, 1903.

216. **Beco.** Two tumors of the nose. *La Presse otolaryng. Belge*, 1903, 2.

217. **Kimball.** Angioma of nasal septum. *Annals of Otol., Rhinol., and Laryngol.*, March, 1903.

218. **Coakley.** The treatment of abscess of the septum, with special reference to the prevention of subsequent deformities. *Annals of Otol., Rhinol., and Laryngol.*, March, 1903.

219. **Wright.** Notes from the throat department of the pathological laboratory of the Manhattan Eye and Ear Hospital. *Amer. Journ. Med. Science*, June, 1903.

220. **Waggett.** Case of primary tuberculosis of the nasal septum. *Proc. Laryng. Society*, May 1, 1903.

221. **Montague and Lake.** A case of nasal calculus weighing forty-eight grains. *Lancet*, April 26, 1903.

214. A woman, aged twenty-six years, had had a tumor filling the anterior half of the right vestibule, of three months' growth. It was the size of a small bean, and was attached by a very thin pedicle to the outer wall, close to its anterior end, and about $\frac{1}{4}$ inch from its external edge. The tumor was composed of much young spindle-celled tissue, traversed by numerous large lymphatic channels and covered by skin. ARTHUR CHEATLE.

215. A married male Mahometan, aged twenty-two, a worker in rawhides, had had a growth in the left nostril for three years,

which bled frequently. It was removed with forceps, and there was no trouble for six months, when it recurred and was removed by a native barber, but a few months later it recurred again. A small vascular pedunculated tumor, about the size and shape of a large pea, was then seen growing from the mucous membrane at the anterior and upper part of the cartilaginous septum. It was then removed with forceps and cold snare, but recurrence soon took place and the patient was lost sight of. A long microscopical report is given. ARTHUR CHEATLE.

216. (1) Telangiectatic mucous polyp inserted in the vestibule to the inner surface of the alæ nasi.

(2) A large malignant tumor of alveolar structure, which occluded the anterior left nasal canal and the naso-pharynx. It was removed with dependent head by rhinotomy. Recovery, without disfigurement; after a short time, a fatally terminating relapse. Perforation through the base of the skull.

BRANDT.

217. KIMBALL found in a man, fifty-six years of age, who has suffered for several years from nasal obstruction and hemorrhages, a large bilobular growth, pedunculated and hanging from the right nasal cavity, situated on the septum and pulsating, while in the left nostril, slightly lower down on the septum a sessile, a single-lobed bleeding growth was seen. Both tumors, separately removed under extreme hemorrhages, were composed of blood-vessels, held together by connective tissue and interspersed with round and spindle-shaped cells. They were angiomas; no recurrence took place. M. TOEPLITZ.

218. In order to prevent depression or flattening of the nose after evacuation of bilateral abscesses of the septum, in which a portion of the cartilage is lost and the septum is broadened through the separation of the two layers of the muco-perichondrium, COAKLEY advised the use of the Simpson tampon after incision, and at the end of a week a nasal splint is substituted.

M. TOEPLITZ.

219.

I. A rapidly recurring bleeding polyp of the septum nasi appearing twice in a woman, each time at the seventh month of pregnancy.

In a woman aged twenty-five years, a round vascular growth sprang from the inferior and posterior edge of a perforation which, consisting of very vascular granulation tissue, rapidly recurred after extirpation and was then larger than before. It

was now removed radically with the underlying cartilage. About one year later the growth had returned during the seventh month of pregnancy; it was removed and rapidly recurred. It appeared covered by degenerated epithelial cells, under which was a layer of hyaline degeneration of the connective tissue. The growth is made up of loose œdematous connective-tissue, a large number of mononuclear round cells traversed by very numerous capillaries. There is considerable inflammatory action, but no proof of the malignant nature of the growth. After delivery of the child the growth has been rapidly disappearing.

II. Papillary adenomatous hypertrophy of the mucous membrane of the septum.

A man, aged thirty-five years, had ten years ago an abscess of the frontal sinus, which ruptured spontaneously and was curetted through an outer opening. Since then polypi of the nose and frontal sinus developed. The growth removed from the right side of the septum was situated at its anterior third, at the junction of the triangular cartilage with the vomer, and was in contact with the floor of the nose. It was bleeding moderately and recurred since the operation. Microscopically there was a very corrugated surface, lined by a thin layer of columnar epithelium; the stroma was loose and œdematous; the epithelium was columnar, and a number of rings were separated from the surface in the substance of the growth.

III. A cyst in the lymphoid tissue of the pharynx.

The specimen came from the glosso-epiglottic fossa. Several contiguous microscopic lymph nodes embedded in the loose connective tissue were the seat of the cyst formation. At the larger end almost the entire centre of a lymph node is seen to be taken up by the dilated lymph space; at the small end the beginning of another cyst is seen forming. These are true lymphatic cysts.

IV. Effusion of serum into the nasal mucosa in coryza.

Besides cysts, in acute coryza, the dilatation of lymph spaces is due to sudden and excessive exudation of serum from the blood-vessels into the stroma weakened in the process of chronic inflammation.

M. TOEPLITZ.

220. A man aged thirty-five years, in failing health, suffered pain in the nose and frontal regions for two years, and exhibited an extensive superficial ulceration of the mucous membrane of

the left side of the nasal septum, an inch in diameter, with a yellow and granular base. The anterior edge was heaped up and a specimen taken from that portion showed tuberculous tissue with well-developed giant cells. Examination of the lungs showed increased vocal resonance over the right apex in front and behind.

ARTHUR CHEATLE.

221. A woman, aged thirty-six years, complained of offensive discharge from the left nostril, a disagreeable taste in the mouth, and inability to breathe through the nose for five years.

The nucleus consisted of a cherry-stone, the crust being formed of earthy carbonates and phosphates.

ARTHUR CHEATLE.

d.—OTHER DISEASES OF THE NOSE.

222. **Dunbar.** On the etiology and specific treatment of hay-fever. *Berl. lin. Wochenschr.*, No. 24 ff., 1903.

223. **Thost.** New experiments on hay-fever and its treatment. *Munch. med. Wochenschr.*, No. 23, 1903.

224. **Grunert.** A case of rhinogenic pyæmia terminating in recovery. *Munch. med. Wochenschr.*, No. 14, 1903.

225. **Moure and Brindel.** On the treatment of ozæna with injections of paraffin. *Neue Therapie*, 1903.

226. **Sacher.** On rhinoliths. *Wratschebnaja Gaseta*, 1903.

227. **Bentzen.** A case of congenital atresia of the choanæ. *Ugeskrift for Læger*, No. 20, 1903.

222. This paper relates further investigations of the author in his attempts to obtain a specific curative agent against hay-fever. After a short historical introduction, the experiments on the etiology of hay-fever are described, which have convinced the author that certain albuminous bodies contained in the pollen of various grasses by a toxin action produce hay-fever in pre-disposed individuals. DUNBAR has attempted to produce an anti-toxin for this pollen-toxin by infecting horses with a certain amount of pollen-toxin. In some of the animals, severe general symptoms set in, and the serum of these animals showed, after repeated injections, anti-toxic faculties. The pollen-toxin mixed with this blood serum did not cause any irritation on the mucous membrane of patients suffering from hay-fever, while in a pure state it causes very severe irritation. Experiments with hay-fever produced naturally, and not artificially through pollen-toxin, were not possible at the present time. The few observations appear to confirm the results of the laboratory experiments. In a number of cases, if the antitoxin was instilled in the form of

a few drops in the nose and in the eye on onset of the first irritations, the attack of hay-fever was cut short. The author as yet does not think it wise to apply the serum subcutaneously, inasmuch as it can in some hay-fever patients produce very unpleasant symptoms of irritation.

MÜLLER.

223. THOST reports on Dunbar's paper, and confirms the statement that the pollen-poison in predisposed persons causes symptoms of hay-fever to appear, while in those persons who are not predisposed—but suffering from a nervous coryza—no symptoms were produced. The paralyzing of the pollen-poison with Dunbar's antitoxin was always possible for at least one day. He believes that the remedy, even if it cannot cure the first attacks of hay-fever, nevertheless is of great differential diagnostic importance.

SCHEIBE.

224. In a young girl, ten years of age, severe pain in the head and in the left eye suddenly set in. Four days later there was a discharge of pus from the left nose, severe swelling of the back of the nose and of the eye, as well as high remitting fever to 40° C. At operation, pus was found in the frontal, ethmoid, and maxillary sinuses. High fever continued for some time. After it had decreased and the wound as well as the nasal discharge had completely healed, an abscess developed on the right and on the left arm. No chill. Recovery.

SCHEIBE.

225. Twenty patients with ozæna were treated after an application of cocaine by the injection of paraffin into the submucous tissue of the turbinates and of the septum; and the authors believe that if it is possible to restore to the nose its normal calibre recovery is assured. Of the cases remaining under observation, 62 % were healed, 26 % were improved, and 11 % remained unchanged.

BRUEHL.

226. The nucleus of a rhinolith in the nose of a girl sixteen years of age proved to be a sunflower seed. This had probably been in the patient's nose for ten years. It was situated deep in the nose, behind a spur, and was extracted by a hook-shaped probe.

SACHER.

227. A woman thirty years of age, had never been able to breathe through her nose; there was no sense of smell; the nasal cavities were filled with pus; the turbinates were normal. Seven *cm* behind vestibule a firm commissure was encountered. Posterior rhinoscopy showed that the choanæ were normal, but immediately

in front of them there was a yellowish-white osseous-like wall covered with normal mucous membrane; above, symmetrical on the two sides, there was a small depression. The teeth were normal; the palate was well-shaped, but very high. A passage was made with the galvano-cautery, and a good result was obtained.

MOELLER.

THE SOFT PALATE, PHARYNX, AND MOUTH CAVITY.

228. Roemheld. On isolated chronic contractions of the soft palate. *Münch. med. Wochenschr.*, 1903, No. 13.

229. Rousseaux. 1. Myxoma of the palatal tonsil. 2. Voluminous fibroma of the larynx; extraction by natural ways. *La presse otolaryngologique Belge*, 1903, No. 2.

230. Boulai. Two cases of large pulsating vessels of the pharynx. *Arch. internat. d'otol.*, etc., 1903, p. 381.

231. Burkhard. The operative treatment of dangerous bleeding after tonsillotomy. *Wiener klin. Wochenschr.*, 1903, No. 22.

232. Jonquière. A case of secondary gangrenous angina. *Correspondenzblatt f. Schweizer-Aerzte*, 1903, p. 248.

233. Iwanow. On the angina of Vincent, and its complications. *Medicinskoje Obosrenje*, 1903, No. 2.

234. Stolkind. Four cases of ulcerous Vincent's angina. *Djetskaja Medicin*, 1902, No. 6.

235. Pegler. Chronic spasms of the soft palate, causing objective noises in the pharynx in a woman aged twenty. *Proc. Laryng. Society*, April 3, 1903.

236. Steward. A case of chronic contraction of the palate, adductors of the cords, and certain other muscles. *Ibid.*, March 6, 1903.

237. Pegler. A case of chronic spasm of the muscles of the palate and pharynx, causing entotic tinnitus in a lady aged thirty. *Ibid.*, March 6, 1903.

238. Griffith. Salivary fistula caused by stenosis of the parotid duct. Operation; recovery. *American Medicine*, April 4, 1903.

239. Cobb. Peritonsillar abscess. *Annals of Otol., Rhinol., and Laryngol.*, March, 1903.

240. Quinlan. Malignant tumors of the naso-pharynx. *The Laryngoscope*, May, 1903.

228. In an old lady with a neuropathic tendency, an apoplexy was followed by clonic half-sided contracture of the soft palate and slight paresis of the same. In the beginning there was some disturbance of speech. The upper respiratory passages and the ear were normal.

SCHIEBE.

229. 1. ROUSSEAU reports a case of myxoma of the left palatal tonsil, of which, up to the present time, only five have been reported in literature (Masse, Rivière, McKenzie, Haug, and Cozzolino).

2. The laryngeal fibroma is interesting on account of its size. It had a wedge shape, 35mm long, 10-18mm broad, and was attached with its thick end to the anterior commissure 1mm above the right vocal cord. It was removed with the cold snare.

BRANDT.

230. In two patients fifty and fifty-five years of age, respectively, a pulsating vessel was accidentally discovered, having a thickness of a goose quill, in the right posterior pharyngeal corner. In one of the cases, the pulsation ceased on pressure exerted upon the cervical vessels.

OPPIKOFER.

231. BURKHARD believes that the number of operations in threatening hemorrhage will be decreased by adrenalin—an opinion which, according to the reviewer, is probably fallacious, inasmuch as we get cases of arterial hemorrhage. The author gives a drawing of the anatomical relationships, and comes to the conclusion that it has not thus far been definitely settled which vessel is injured, and whether it is always the same. He believes that ligation of the common carotid is without reason, even though ligation of the external carotid, especially in cases where the facial or lingual arteries are injured, is indicated. The method previously advocated by Nicoladoni, to attack the tonsils from the external surface, is recommended. The cutaneous incision begins 1cm behind and below the insertion of the auricle, and extends in the form of an arc down and forwards one finger above the large cornu of the hyoid bone. The various tonsillar vessels are ligated, the stump of the tonsil is pressed outwards, and, after opening the pharynx, is extirpated; the pharynx is then closed by suturing the palatal pillars.

WANNER.

232. A man, fifty-two years of age, has been quite ill for a number of years, more probably due to leucæmia rather than to tertiary syphilis—possibly both diseases were present. Six weeks before death, gangrene of the lungs set in; five weeks later, the left tonsil became gangrenous.

OPPIKOFER.

233. The author found, as a frequent complication, a polymorphous exanthem and articular pains; rarely there were albuminuria abscesses, and even appendicitis. In addition to Vincent's bacilli, streptococci were also found in the membranes, which are supposed to be due to complications. Complications were most frequent in those cases with severe stomatitis or glossitis.

SACHER.

234. The three cases were children varying in age from four and one-half to eight years; the fourth was an adult. In the latter, the clinical picture of the lacuna angina was present; in the first three the angina resembled diphtheria, and was characterized by a very marked fetor. In all the cases, the individuals were feeble and anæmic, a condition which appears to be predisposed to Vincent's angina. SACHER.

235. The patient had entotic tinnitus in the left ear for two months. The uvula moved upwards at the rate of 240 contractions a minute. The adductors of the cords contracted simultaneously, but every few seconds the cords remained widely abducted for a second or so. Adenoids were present.

ARTHUR CHEATLE.

236. A woman, aged fifty-two years, had for eighteen months had difficulty in speech and inability to walk without assistance. Ataxic symptoms were present besides the muscular contraction.

ARTHUR CHEATLE.

237. A clicking sound, heard mainly in the right ear, was concurrent with chronic spasm of the posterior pillars of the fauces. The rate of the contraction per minute was 42. The clicking was audible without the diagnostic tube in the ear. Distinct movement at the mouth of the Eustachian tube was visible through the nasal meatus. There was also simultaneous adduction of the arytenoids and vocal cords ceasing on phonation, and contraction upwards of the velum and uvula.

ARTHUR CHEATLE.

238. The patient, a male of seventeen years, had a salivary fistula upon the left side of his face. A sinus was found running upward and backward for about an inch, caused by an ulcerated tooth. The sinus was ligated within the mouth with a curved needle, and a puncture was made below the duct at a point inside the mouth opposite that of the other corresponding opening of the duct of the right side.

M. TOEPLITZ.

239. COBB summarizes his views as follows: Three locations have been claimed as possible situations of peritonsillar abscess. First, the pharyngo-maxillary fossa; second, the supratonsillar fossa; and third, the areolar tissue about the tonsil. From the anatomic conditions and the clinical appearances, the site of the abscess is believed to be the areolar tissue. The incisions used are an upward and backward one, with a straight knife for an-

tero-superior cases, while for postero-superior cases an outward incision between the posterior pillar and the tonsil with a right-angled knife is advised.

M. TOEPLITZ.

240. QUINLAN carefully analyzed the entire literature with reference to growths primary in the naso-pharynx only, and makes therefrom the following deductions: (a) Rapidly growing fibromata of the naso-pharynx, clinically malignant, histologically sarcomatous, are not essentially malignant. (b) True sarcomata with tendency to metastases also occur, but rarely. (c) Cancer may occur as epithelioma, usually as adeno-carcinoma, but not primarily as true cancer. Treatment by injection, electrolysis, extirpation, ligation or excision of arteries, and the use of chemical rays is fully dwelt upon.

M. TOEPLITZ.

ARCHIVES OF OTOTOLOGY.

REPORT OF A FATAL CASE OF BRAIN ABSCESS OF OTITIC ORIGIN.¹

By GORHAM BACON, M.D.

(With two photographs on Text-plate VI.)

The patient, Max S., aged forty-four, single, Russian, was admitted Jan. 21, 1904, and came under my care at the infirmary. He has been a healthy man and denies having had syphilis. He has had two operations on his ear, the first time in September, 1902, when he suffered from acute purulent otitis media. At that date the mastoid cells were opened, and apparently he was cured in several weeks' time.

In the latter part of September, 1903, after blowing his nose quite violently, he felt a sudden fulness in the same ear, followed by pain. An abscess developed behind the ear, which broke, leaving a sinus opening into the mastoid cells. There was also a purulent discharge from the canal.

A radical operation (Schwartz-Stacke) was performed October 3, 1903. The dura above was exposed, owing to a necrotic condition of the bone. A probe entered an opening in the dura leading to the temporo-sphenoidal lobe, but no pus was found at that time. The canal was packed, and the wound, posteriorly, was partially closed, and by October 15, 1903, had entirely healed. During this time his pulse varied from 68 to 100, and his temperature never rose higher than 100° F.

The present trouble has lasted since the second operation. The discharge from the canal has persisted with more or less headache, which patient says is continuous and very severe at times and is confined to the right side of the head, the orbital and parietal regions being especially affected.

¹ Read at the May meeting, 1904, of the Section of Otology in the N. Y. Academy of Medicine.

Examination.—The right mastoid shows the remains of an old depressed cicatrix. There is no tenderness on pressure. At the bottom of the canal can be seen a false membrane with a perforation, and there is some purulent secretion. The patient is fairly well nourished. Tongue coated. Heart and lungs normal.

An ophthalmoscopic examination showed double optic neuritis with hemorrhages.

On January 22d, the day following admission, he complained of a great deal of pain on the right side of the head. He gives no history of dizziness, or vomiting, or seizures of any kind, nor are there any evidences of paralysis. He seems stupid in answering questions. He dozes a great part of the time, frequently moaning and crying out. Temperature at noon to-day was 102.5° F., pulse 80, respiration 20. A diagnosis of abscess in the right temporo-sphenoidal lobe was made.

Jan. 23d.—Operation.

An incision was made from the lowest point of the mastoid and carried close to the auricle upwards and curved around the latter towards the orbit and well into the temporal region. By carrying an incision upward, good exposure was obtained of the mastoid process and the bone covering the temporo-sphenoidal lobe. A large area of bone was cut away from the region of the antrum in a direction upwards so as to uncover a considerable portion of the dura. The dura behind and just above the antrum was found covered with granulations. The middle ear was cleared of all granulations, necrosed bone was removed, and the sinus was exposed and found healthy. The dura over the temporo-sphenoidal lobe was found tense, and a probe was passed through an opening in the dura, in the region of the antrum. A scalpel was introduced in the most dependent portion, and passed upwards and forwards, when from two to three ounces of thick yellowish-green pus were evacuated. There was very little odor to the pus, and the abscess cavity was found lined with a smooth and firm wall. The little finger was introduced to a depth of two inches, and the cavity was gently irrigated with sterile water through a double tube, and sterile gauze was inserted for drainage.

Jan. 24th.—The patient was restless during the night and complained of considerable pain, but feels much better this morning. Temperature, 99.4° F. Mental condition improved.

Feb. 5th.—For the past two weeks the patient has been making

ILLUSTRATING DR. G. BACON'S PAPER.



Photograph of brain showing hernia cerebri.



Photograph of brain showing abscess cavity in temporo-sphenoidal lobe, and a portion of the hernia cerebri.

steady progress and has been free from pain. For a few days after the operation the temperature ranged from 99° to 100° , and gradually became normal, although at times it would rise to 99° or $99\frac{1}{4}^{\circ}$. During this time the pulse varied from 72 to 96. His mental condition has been good. To-day he complains of the same pain again in the right side of the head.

March 3d.—Since February 5th the wound has been frequently dressed and there appeared to be good drainage. The symptoms, however, have been steadily growing worse. In addition to the pain in the head, he has been restless, constantly moaning and crying out. He refuses nourishment, is drowsy a great portion of the time, and is mentally much depressed. Tongue thickly coated and breath foul. Under chloroform anæsthesia I made a thorough examination of the abscess cavity, but could not find anything there to account for the symptoms. The drainage from the abscess cavity was excellent.

March 8th.—As the patient was steadily growing worse I called in Dr. Frank Murray, and finding that there was some tension of the dura anterior to the previous opening, a scalpel was introduced at this point and some pus evacuated. These two openings in the dura were found to communicate with the same abscess cavity in the brain. Drains of rubber tissue and gauze were introduced, and a moist carbolic-acid dressing was applied.

March 14th.—Patient noisy and excited; he tore off the bandage.

March 16th.—Delirious at times, and he requires morphine. Temperature has not been above 100° .

March 17th.—Has been in deep stupor most of the day and he passes his stools and urine involuntarily.

March 19th.—He was again given chloroform, and the two openings in the brain were made into one, and on investigation more pus was found farther forward in the temporo-sphenoidal lobe and in the original abscess cavity.

March 20th.—Temperature rose to 104° after the operation; pulse 96. Involuntary urination and stools continue. He has taken his nourishment somewhat better.

March 21st.—In deep stupor most of the time. The temperature remains high. He has great pain in his head. The pulse is becoming rapid and weaker.

March 22d.—Since the last note, the patient has gradually

become weaker. The temperature rose to 107° at 9 P.M., and he died at 11.30 P.M.

Autopsy.—A large operative wound behind right ear, with hernia cerebri protruding.

Brain.—Vertex showed considerable venous congestion, and a slightly cloudy serous exudate in the sulci. The pons, medulla, and postero-inferior portion of the cerebellum were covered with a plastic exudate. The vertebral canal contained a considerable quantity of sero-purulent fluid. The greater portion of the right temporo-sphenoidal lobe was excavated, and the abscess cavity (which had recently broken into the right lateral ventricle) was filled with a mass of granulating brain tissue.

The left side of the brain, including the ventricles, was normal, except as above.

Smears or cover-glass preparations from the abscess cavity showed mixed infection—streptococcus, staphylococcus, a diplococcus (possibly streptococcus), and a short thick bacillus.

Remarks.—The remarkable points in this case seemed to me to be the absence of the usual symptoms found in such cases. There was no history of a chill, nausea, vomiting, or vertigo. The pulse was not slow at any time, nor was the temperature below normal. In fact, the more common symptoms were absent. The diagnosis pointed to an abscess in the temporo-sphenoidal lobe, from the fact that the patient gave a history of two operations on the mastoid having been performed previously, while for the preceding two months or so he suffered from severe and persistent headache on the same side, and an ophthalmoscopic examination showed choked disc with hemorrhages in each eye.

There was considerable difficulty in draining the abscess cavity. The external opening was large, but there was always a tendency for the pus to burrow, and finally it burst into the lateral ventricle. The post-mortem examination showed that there was no retention of pus in the abscess cavities.

REPORT OF A FATAL CASE OF LATENT TEMPORO-SPHENOIDAL ABSCESS OF OTITIC ORIGIN, FOLLOWED BY MULTIPLE SECONDARY CEREBRAL ABSCESES.¹

By ALICE E. WAKEFIELD, M.D.,

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(With four figures on Text-plates VII. and VIII.)

WHILE the report of every successful operation for otitic brain abscess is a valuable contribution to the literature of otological surgery and a distinct triumph for the surgeon, it is nevertheless a duty to report in detail those fatal cases which are unusual in their course, with the hope that some point may be brought out which will assist in the diagnosis and successful treatment of subsequent obscure cases.

Lillie K., eleven years of age, of German parentage, was brought to the New York Infirmary for Women and Children on April 22, 1903, suffering from mastoiditis following chronic supuration of the left ear.

Heredity.—The family history was unimportant.

Previous Illness.—The child had measles at two years of age, diphtheria at four years, and typhoid fever at five years. Since the last illness she has occasionally had a slight purulent discharge from the left ear.

¹ Read at the Twenty-ninth Annual Meeting of the Alumnae Association of the Woman's Medical College of Pennsylvania, held in Philadelphia, May 19 and 20, 1904.

The mother states that about a year before the present illness the girl began to have attacks of headache, dizziness, nausea, vomiting, and constipation, and gradually lost flesh and strength. She was sent to the country for a few weeks in the summer, but did not regain her health. During the following winter she attended school, but continued to have occasional attacks of dizziness, nausea, and vomiting, and persistently complained of headache. The mother considered these only "bilious attacks," since, with the exception of the first, they were not severe enough to necessitate keeping the child from school or calling a physician to see her.

In the last week of March, 1903, the girl became *much overheated while jumping rope at school, and within a few hours was seized with dizziness and vomiting*. The following day she had severe headache, chills and fever, restlessness, and a slight cough.

On March 27th, Dr. Annie S. Daniel, who has charge of the out-practice of the Infirmary, was called to see the patient, and to her I am indebted for the history of the girl's illness during the four weeks preceding her admission to the Infirmary for mastoid operation.

Present Illness.—From March 27th to April 13th, the patient had right lobar pneumonia. The course of the disease was irregular. From April 4th to the 11th, a chill followed by a rise of temperature occurred daily. The chills varied in intensity from a sensation of cold to prolonged rigor lasting half an hour. Temperature ranged from 100 to 105 degrees. It is to be noted that *severe frontal headache* was a *persistent symptom* throughout this period, and there were exacerbations of pain in the head which caused the child to scream out.

On April 13th, the seventeenth day of her illness, the child said there was a sound in her head as though something had broken, and it was noticed that a *profuse purulent discharge* was coming from her *left ear*. From April 11th to 17th, the chills subsided and the temperature varied from 99 to 103 degrees. The pulse ranged from 80 to 92 and was of good quality. The pneumonia resolved entirely, and the respirations were from 26 to 40 per minute, full and regular.

The discharge from the ear continued free for three days, when it ceased. No special pain or tenderness was referred to the mastoid region, but the child complained persistently

ILLUSTRATING DR. A. E. WAKEFIELD'S PAPER.



Fig. 1.—Showing latent and secondary abscess cavities in left temporal lobe with a portion of the wall separating them.



Fig. 2.—Showing abscess cavity in right temporal lobe.

ILLUSTRATING DR. A. E. WAKEFIELD'S PAPER.



Fig. 3.—Cross-section showing patches of necrotic brain tissue lining the wall of the original abscess in left temporal lobe.



Fig. 4.—Cross-section through secondary abscess cavity in left temporal lobe, also showing left lateral ventricle containing pyogenic membrane.

of violent frontal headache. She became thinner, paler, and more restless. Her sleep was troubled. She appeared somewhat dull, but, when aroused, answered all questions intelligently, and took food when it was offered her, but she did not call for it.

On April 19th, the child became cyanosed and had a violent chill, which the mother thought was a convulsion, which lasted half an hour; temperature, 105° ; respiration, 26; pulse, 96. The child was conscious and complained of loud noises in her head.

On April 22d, the patient was restless and *delirious*; passed urine involuntarily, and had a prolonged chill followed by temperature 106.4° , pulse 122, respiration 22. The discharge from the left ear reappeared; there was some tenderness over the mastoid; and the patient was removed to the hospital for operation.

Condition on Admission to the Hospital.—The patient was extremely thin and her expression was one of profound exhaustion. The skin was dry and of a yellowish hue; the lips were dry and brown, and the teeth covered with sordes. Her mind was clear, and she answered all questions readily and intelligently. There were no paralyses.

Eyes.—Vision was unaffected. The pupils were of medium size and equal, and their reaction to light and accommodation was normal.

Ears.—The right ear was normal. The left ear-canal was narrowed and contained thick green pus. The drum membrane was bulging at its junction with the upper canal wall. The soft tissues over the mastoid were reddened and œdematous. Deep pressure over the antrum gave the child considerable pain.

Operation.—The patient was immediately prepared for operation, and under ether anæsthesia a free incision was made through the upper and back part of the drum membrane and the sagging canal wall. The mastoid region was then exposed by the usual incisions. When the periosteum was raised, a small adherent granulation was found over the centre of the antrum pit. Upon its removal pus welled up. While the entire mastoid cortex was being chiselled away, the discharge of pus from the antrum was marked by pulsations which were synchronous with the heart-beats and were increased by coughing. This seemed to indicate that the inner table of the mastoid had been destroyed; and upon careful removal of the necrosed tissue with a dull curette the vertical arm of the sigmoid sinus was exposed.

The upper part of the antrum and the aditus were then cleansed of granulations and a probe was passed into the tympanum, the walls of which were found roughened. No perforations into the cranial cavity could be detected, and a dressing of iodoform gauze was introduced into the aditus and upper part of the antrum, to shut off this space from that around the exposed lateral sinus. Further examination of the exposed sinus showed that the dura was thickened, discolored, and covered with grayish granulations. No pulsations were visible; the sinus wall was partially collapsed, and thrombosis was suspected.

An incision about 4mm in length through the wall of the sinus brought a free flow of blood. The hemorrhage was immediately controlled by pressure and the usual mastoid dressings were applied.

Course after Operation.—For the twenty-four hours following the operation, the temperature did not rise above 102° F.; pulse, 104; respiration, 22. The patient slept continuously for four hours; no vomiting; took nourishment well; was sensitive to noise.

April 23d.—The patient had a comfortable day and slept well the following night.

April 24th.—At 9 A.M. she had a chill lasting fifteen minutes; temperature, 105.6°; pulse, 116; respiration, 32, irregular in depth and frequency. The dressings were changed, and the incision which was made in the sigmoid sinus two days previously was reopened with a probe. The sinus was found free and the dressings were reapplied.

April 25th.—The child slept only two hours during the night, was restless and irritable, and did not want to be touched; urinated involuntarily. At 1 P.M. had a slight chill; temperature, 104°; pulse, 136; respiration, 28, irregular in depth and frequency.

April 26th.—At 6.30 A.M. the patient had another chill; temperature, 104°; pulse, 136; respiration, 36, regular but shallow. She had periods of extreme restlessness alternating with drowsiness. When aroused, she answered all questions intelligently. There was no aphasia and no paralysis. Examination of the lungs and heart gave no signs that these organs were affected.

Examination of the Eyes.—No paralysis of ocular muscles; pupils about one-third dilated, equal; reaction to light sluggish. The retinal veins of the left eye were engorged and tortuous.

The color of the disc was grayish and its outline hazy. There were no hemorrhages. The retinal veins of the right eye were somewhat injected; otherwise the interior was normal.

The recurring chills followed by high temperature, the violent and persistent headache, the increasing drowsiness, the appearance of the eye-grounds, with beginning dilatation of the pupils, the occasional extreme restlessness, the irregular and shallow respiration, and the rapid pulse indicated, in the absence of sinus thrombosis, other intracranial suppuration. Since there were no localizing symptoms, it was decided to explore the left temporo-sphenoidal lobe as being the most probable site of suppuration.

Second Operation (April 26th).—The patient was prepared for operation, and the original mastoid incision was extended upward and forward along the root of the zygoma for a distance of about 3cm. With a rongeur forceps the opening in the mastoid was enlarged upward and forward until an area of dura measuring $2\frac{1}{2}$ by $1\frac{1}{2}$ cm was exposed. The opening thus made in the bone gave ready access to that part of the temporo-sphenoidal lobe which directly overlies the tympanum. The dura, which was uncovered, was normal in appearance; there was no bulging and no visible pulsation. The finger was then introduced under the temporo-sphenoidal lobe along the floor of the middle cranial fossa, and firm adhesions were found between the dura and the roof of the tympanum. These adhesions were not broken.

A curved incision about 3cm in length, with its convexity directed backward, was then made in the lower and back part of the exposed dura. The surface of the brain tissue was somewhat congested; it protruded slightly through the dural opening, and pulsations could be distinctly felt. A grooved director was passed into the temporo-sphenoidal lobe forward and inward for a distance of 4cm, when a thin, turbid, grayish fluid appeared along the groove of the director. A small pair of artery forceps was then passed along the director, which was held in position until the blades of the forceps were separated, to enlarge the opening. About two drachms of thin fluid, containing finely granular particles and shreds of degenerated brain substance escaped. The little finger was then introduced into this cavity, the walls of which were felt to be roughened but firm and resistant. A few shreds of degenerated brain tissue were removed when the finger was withdrawn. The cavity was lightly packed

with a narrow strip of iodoform gauze and the outer dressings were applied. A specimen of the fluid and shreds of tissue taken from the cavity were sent to the pathologist for examination.

April 26th and 27th.—For two days following the opening of the cerebral abscess, the patient's condition improved. She appeared much brighter, and the pain in her head subsided. She enjoyed her food and conversed quite naturally. She was interested in other patients in the ward and asked to see the pictures in a magazine. There were no chills. The temperature ranged from 98.4° to 103° ; pulse 100 to 116, regular and of good quality; respiration 28 to 32, regular. The child was more quiet during sleep. The dressings were changed daily. The mastoid wound discharged little pus. The drainage gauze from the abscess cavity was moist but showed no pus.

April 29th.—On the third day following the first operation, the patient was much worse. She had a chill lasting fifteen minutes; temperature, 104.2° ; pulse, 118; respiration, 32, irregular; perspired profusely; had attacks of screaming and was at times delirious. The left eye began to turn inward; the left pupil was greatly dilated and did not react to light. The patient refused food and medicine.

While changing the dressings, the drainage gauze was carried into the abscess cavity with dressing forceps. The slight pressure which was made to reach the highest point of the cavity broke down the wall between this and a *second abscess* situated above and behind the first, and one and one-half ounces of offensive, thin, green pus poured out of the dural opening. A finger was then introduced into the second cavity, and the opening between the two was enlarged sufficiently to insure proper drainage. The outer dressings were then applied.

April 30th.—The patient was more quiet during the following night. She had no chill; temperature ranged from $98\frac{1}{4}^{\circ}$ to 101° ; pulse, 110; respiration, 28; vomited food and medicine. During the night, the nurse noticed that the child did not move her right arm or leg. She lay in stupor much of the time, but, when aroused, recognized her mother and spoke to her.

May 1st.—There was left internal strabismus, left facial paralysis, and right hemiplegia. The head was retracted, and there was difficulty in swallowing.

May 2d.—The patient sank into coma, and died on the morning of the tenth day after her admission to the hospital.

Post-Mortem.—The body was extremely emaciated. There were no skin lesions. The lungs showed slight congestion and œdema of lower lobes. The bronchial glands were not enlarged. The heart was normal. The abdominal organs were practically normal. The mesenteries were not enlarged.

The Brain.—The dura was congested, thickened, and firmly adherent along either margin of the median fissure. On its removal, a thin strip of cerebral cortex, 7mm in width and 4cm in length, was torn off. No pus was visible over the cerebral surface above. Careful examination of the sinuses of the dura revealed no thrombi. The left lateral and sigmoid sinuses were thoroughly explored, even down beyond the jugular bulb, and were found entirely free. The dura mater at the base was normal excepting that portion which covers the surface of the left petrous bone corresponding to the roof of the tympanum. Here its outer surface was covered with dense connective tissue which was closely adherent to the bone underneath for an area measuring 7 by 12mm. The adhesions were firm and appeared to have been of long standing. There was no evidence of extension of the inflammatory process on the inner surface of the dura at this point nor in the brain cortex overlying it.

The portion of bone forming the roof of the tympanum was roughened by adhesion to the dura and showed a dark bluish-gray discoloration. There was no erosion of the bony surface, and no perforation from the tympanic cavity could be made out.

Hemispheres.—The cerebral veins over the **left** hemisphere were engorged and the convolutions markedly flattened. The left temporal lobe presented near the centre of the second convolution an opening which was made at the time of the operation. It measured 2cm vertically and 1½cm horizontally.

About the margin of the opening, the dura and the pia were intimately adherent for a distance of 1cm. This opening led into an abscess cavity in the anterior part of the temporo-sphenoidal lobe, the diameter of which from before backward was 4cm and from below upward 2cm at the deepest part. The anterior limit of the abscess cavity reached to within 1½cm of the anterior limit of the temporo-sphenoidal lobe. The thickness of the outer wall, measured along the opening into the abscess cavity, was a little more than 1cm.

The inner wall of the abscess cavity showed several large dark bluish patches, the surface of which was roughened and

presented shreds and tags of disintegrated brain substance (Fig. 3). Between these plaques of necrotic tissue were smooth, white, firm areas representing the general abscess wall.

At the upper and back part of the cavity was a ridge 6mm in thickness of apparently normal brain tissue which represented a portion of the *wall between the original latent abscess and the secondary abscess* (Fig. 1). The opening between these cavities admitted the tip of the index finger and looked upward and backward into the second cavity, which measured 4.5cm in its antero-posterior diameter and 3cm vertically. The deepest portion lay near the posterior extremity of the temporo-sphenoidal lobe, but did not encroach upon either the parietal or the occipital lobe. The abscess cavity did not approach the outer surface of the cerebral cortex nearer than 2cm at any point (Fig. 4). The walls of the secondary abscess were smooth and white and showed no areas of necrosis. There was no obvious communication between this abscess cavity and that of the left lateral ventricle (Fig. 4).

The surface of the **right** hemisphere presented venous engorgement and compression of the convolutions equal in degree to that seen on the left. The surface of the temporo-sphenoidal lobe was partially collapsed, and on making an incision along its outer border (Fig. 2) about four ounces of thin green pus escaped. The abscess cavity measured 6cm horizontally and 2cm vertically, and communicated directly with the right ventricle by way of its middle horn. *A thin, white, homogeneous membrane lined the abscess cavity like a sac.* It was not adherent to the walls and collapsed when the abscess was incised. A prolongation of this "pyogenic"¹ membrane extended along the middle horn of the lateral ventricle upward into the body of the ventricle. The lateral ventricles were only slightly dilated, the right more than the left. Both were lined with pyogenic membranes (Fig. 4). No point of suppuration was found in the frontal, parietal, or occipital lobes of either hemisphere.

Cerebellum.—The under surface of the cerebellum presented a sharply limited, subpial accumulation of pus which covered nearly two-thirds of the under surface of the right hemisphere and, extending across the medulla, included one-half of the under surface of the left hemisphere. Over this area, the pia was

¹ Report of Dr. Louise Cordes, Pathologist, New York Infirmary for Women and Children.

opaque, thickened, and separated from the general cerebellar surface, and was raised from the depth of the sulci by the accumulation of purulent exudate. The interior of the cerebellum was apparently normal.

Bacteriological Findings.—Cultures on glycerine agar from the latent and secondary abscesses of the left temporal lobe, from the abscess in the right temporal lobe, from the subpial abscess on the under surface of the cerebellum, also from the blood taken from the vessels of the lungs and the cavity of the heart,—all showed an almost pure growth of the bacillus pyocyaneus.

Microscopic examination was made of the following areas of the brain:

- (1) The floor of the old abscess cavity.
- (2) The wall between the secondary abscess and the left lateral ventricle.
- (3) The floor of the fourth ventricle.
- (4) The central portion of the inferior surface of the pons.
- (5) The wall of the abscess cavity in the right temporo-sphenoidal lobe.

Sections of the floor of the old abscess cavity show extensive degeneration and breaking down of the cerebral substance, which is infiltrated with pus cells. A large amount of exudate surrounds the blood-vessels, many of which contain thrombi. There are numerous hemorrhagic areas which contain free brown pigment. In some of these areas the red blood cells are well preserved. The brain tissue external to the degenerated areas is markedly œdematous and is infiltrated with fibrin and small round cells.

The wall between the secondary abscess and the left lateral ventricle has undergone degeneration and is everywhere infiltrated with small round cells. Perivascular exudate is marked, and the blood-vessels contain thrombi.

The remaining regions above enumerated show the following lesions in varying degrees of intensity: perivascular exudate and thrombosis; œdema of the brain substance, and infiltration of same with small round cells. A layer of fibrin and pus lines all the ventricles, and there are swelling and degeneration of the epithelium covering the ependyma. The pia mater covering the right lobe of the cerebellum is very markedly thickened. The membrane is infiltrated with fibrin and pus and the blood-vessels are much congested. The cerebellum is free from purulent infiltration.

CONCLUSIONS.

I. The history of this case emphasizes the fact that cerebral abscess may develop insidiously and remain quiescent, manifesting no characteristic symptoms for an indefinite period, until some acute illness or violent physical exertion renders the latent process manifest.

II. Uncomplicated acute cerebral abscess may be accompanied throughout its course by repeated chills, high temperature, and rapid pulse and respiration.

III. Localizing symptoms may be absent, unless the abscess itself or the surrounding encephalitis encroaches upon cortical areas whose functions are definitely known.

IV. Chronic suppurative otitis media attended with persistent localized headache and occasional attacks of dizziness, nausea, and vomiting, and with progressive loss of flesh and strength, should, in the absence of tuberculosis or other malignant disease, suggest the possibility of latent cerebral abscess.

V. The importance of post-mortem examination in obscure cases cannot be too strongly emphasized.

REMARKS ON A DOUBLE CEREBELLAR ABSCESS,
OPERATIONS, AND RECOVERY, REPORTED
BEFORE THE NEW YORK ACADEMY OF
MEDICINE, ON JANUARY 8, 1903.¹

BY WELLS P. EAGLETON, NEWARK, N. J.

THIS paper has not been heretofore published, as Röpke has called attention to the fact that many successfully reported cases have, subsequently, terminated fatally. The case herein reported was operated on July 2, 1902. The patient has continued in perfect health, and remains so up to the present time, April, 1904.

Symptoms.—Severe pain in the head, rapid loss of flesh, vomiting, slow pulse, optic neuritis, and gradually deepening coma.

Diagnosis. Brain abscess. But was the suppuration located in the cerebrum or cerebellum? The *slight* lateral deviation of the eyes to the opposite side, frequent yawning, absence of the patellar reflexes, and indefinite history of total blindness of the previous day, pointed towards the cerebellum. Against this—twitchings of the opposite side, and inequality of the pupils.

It should be noted, that all the symptoms present before the first operation were either the general symptoms of increased intracranial pressure, or of irritation, there being no paralysis whatever. Later, however, during the development of the second abscess, a distinct paralysis of the hand and arm of the same side appeared. The

¹ See ARCHIVES OF OTOTOLOGY for April, 1903, pp. 152-158, vol. xxxii., No. 2.

explanation probably lies in the difference in the position of the two abscesses.

Acland and Ballance say: "Clinical evidence seems to favor the view that the nucleus dentatus, or the bundle of fibres passing from it upwards, must be involved by the abscess when the type paralysis is present."¹

At the time of the first operation, the abscess was small, and situated so externally in the lateral lobe of the cerebellum that the dentate nucleus was not affected, but when the second abscess developed, which extended well inwards, towards the median line, and, doubtless, involved the nucleus, paralysis of the upper extremity of the same side appeared.

Cause.—Was the abscess due to the otitis media, or to the blow on the head? The rapid development of the supuration (19 days) from the beginning of the otitis tends towards the blow, as it is very rare to have an otitic brain abscess develop so rapidly. On the other hand, the absence of all signs of trauma, although carefully searched for by Dr. Potter during the early days of the illness, and the operation, certainly point towards the ear, as traumatic abscesses are always accompanied either by fracture, wound, or bruise, through which infection enters. It is possible that both factors contributed. The otitis supplied the infecting micro-organisms, and the blow lowered the vitality of the brain, thereby furnishing a soil for their propagation. A similar combination of otitis and blow has been recorded in a case reported by Roughton.²

If the ear was the cause, what was the path of infection? Surely not through the lateral sinus, as no symptoms of thrombosis were present. Probably not through the labyrinth, for although prior to the operation no tests of the hearing, etc., were made, yet within a few weeks the hearing was excellent, and the tuning-fork reaction gave no evidences of labyrinthian involvement.

Method of Operating.—The first question to be answered was: Shall the cerebellum be opened directly through the

¹ *St. Thomas's Hospital Reports*, vol. xxiii., p. 160.

² *The Lancet*, July 2, 1902, p. 217.

occipital bone, or from the mastoid antrum, following a fistula, if found, and if not, through and along the posterior surface of the petrous portion of the temporal? The latter has been recently adopted, as by this method the dura is exposed over the most frequent superficial point of supuration, and the operation follows and destroys the original path of infection, whereas, by opening from the occipital, the original focus of infection remains, which may in the future cause further trouble. Although this is true, the operation from the antrum presents several disadvantages which are not encountered by the older method. The opening through the petrous must, of necessity, be very small, too small, in fact, to admit of thorough exploration. The space between the sinus and the posterior semicircular canal varies from 0.5 to 2cm,¹ which of itself is entirely too limited, but when we consider that this narrow space is situated not only at a considerable depth from the surface, but also at a more or less acute angle, the difficulties will be realized. Moreover, the exploration from the temporal, proceeding from an infected area, as it does, cannot be carried on aseptically, so that if (as has frequently happened) the abscess is not in the cerebellum, but in the cerebrum, the former will become infected by the exploration. And, furthermore, and by no means unimportant in a case of brain abscess, the operation is much more protracted, especially if the antrum has not been previously exposed. Contrariwise, if the opening is made through the occipital it can, and *should*, be of sufficient size to allow of thorough exploration of all parts of the cerebellum by the finger. It can be conducted strictly aseptically, as it goes through an entirely uninfected area, and can be done much more rapidly. The importance of rapidity was recently demonstrated to the writer, whilst assisting at an operation for cerebellar abscess, through the petrous portion of the temporal. The uncovering of the dura was difficult and tedious, as the bone was not only sclerosed, but the sinus was situated so far forward as to afford but little space, and this at almost a right angle. Before the dura had been sufficiently

¹ Okada, quoted by Arnold Knapp, ARCH. OF OTOLGY, vol. xxxi., p. 103.

exposed (for purpose of exploration), the patient suddenly expired. The autopsy revealed a cerebellar abscess, which, doubtless, would have been found, inasmuch as a fistula just anterior to the part already exposed, existed.

The abscess, however, could have been easily evacuated through an opening in the occipital, in much less time than had been consumed. It would seem then that the rational way to treat a cerebellar abscess is, first to drain it, through a large opening in the occipital bone, and at a subsequent operation remove the source of infection from the temporal, and at the same time make another opening into the abscess cavity from the front, if better drainage can thus be secured.

Exploration of the Cerebellar Substance.—What instrument offers the best chance for success—pus finder, knife, probe, forceps, or finger of operator? All have failed, and all have succeeded. If the pus is very thick, and at a distance from the surface, the entrance into the abscess by the knife may not be followed by evacuation, as happened in the case of the writer, in which, after having found a drop of pus with a large aspirator, the passage of a knife into the cavity was not followed by the expected discharge. But the introduction of the opened blades of a forceps caused the slow escape of very dense pus. If sole reliance had been placed on the knife, as many advise, the abscess would probably not have been located.

In the case reported, exploration was made with the probe, an instrument never to be used, as it possesses none of the advantages of the knife or pus finder. Using the probe as I did, I feel sure that, if the pus had not been of very thin consistence, the abscess would have been missed, or, at any rate, not found until considerable unnecessary damage had been done to the brain tissue. As it was, after two passages of the probe, the *odor* of pus was first discerned, for the cavity *had* been entered, although no pus flowed.

The abscess having been found, how should it be treated? Under no circumstances should the exploring instrument be removed, but another passed alongside of it, in order to

enlarge the opening, and this should not be moved until the entire cavity has been evacuated and the drainage material introduced. If an abscess is partially evacuated, the surrounding brain tissue rolls in immediately from all sides, thereby converting it into a much smaller cavity, which, if once lost, it may be impossible again to find. The importance of this was exemplified in the present case. On the withdrawal of the probe, a closed forceps was passed in the same direction, and, on opening the blades, thin pus flowed freely. Between the opened blades, the little finger was introduced. No limiting membrane was apparent—in fact, no cavity at all, nothing but œdematous brain tissue. I had just repeated the warning given by Ballance, viz.: “Many a case has been lost after pus has been evacuated, owing to failure to introduce the tube in the proper position” (page 341). When the forceps slipped, the pus immediately stopped, and despite several efforts with the forceps and the exploring finger, the abscess cavity was not again found. The explanation of this failure is not difficult. The abscess was probably perforated at its most external and upper part, and almost emptied, its walls collapsing; but as long as the forceps were held in position the external wall was prevented from moving inwards. The moment, however, that the blades slipped, this wall fell in, and the remaining small abscess cavity was then too far inwards and below to be reached by the original tract. The drainage tube that was inserted was not in the abscess at all, but external, and probably above it. The failure to locate the second abscess several days later, by the finger, was due to the non-realization of this fact, and to the natural position that the finger took when standing above the patient, its palmar surface being directed upwards and outwards, while the abscess was below and towards the inner side, next to its less sensitive dorsal surface.

Hernia Cerebri.—The dread of this has too frequently caused surgeons to refrain from making large openings in the dura, for it has been believed that large openings would surely be followed by hernia. However, it is now generally admitted that hernia cerebri, succeeding evacu-

ation of brain abscess, is caused by increase of the intracranial pressure, either from sepsis or hemorrhage. The former is, by far, the more frequent; wherever imperfect drainage exists, a hernia is almost sure to develop, no matter how small the opening. This is confirmed by the present case. At the first dressing after the original operation, a small hernia had appeared, which slowly increased in size until the evacuation of the second abscess, on the opening of which it immediately collapsed, as if it were a cyst, and never again recurred, although no means were adopted to prevent it.

Again, a small opening not only increases the probability of a hernia, but actually prevents its relief when it does occur. I have seen an enormous hernia from a cerebellar abscess protrude through an opening just large enough to admit the little finger. This hernia repeatedly recurred despite partial, and, at last, complete resection. Assuming the foregoing to be true, it is safe to infer that the day of small openings into the dura is passed, as by the small opening the probability of hernia instead of being diminished is greatly increased.

The general surgical principle of making an opening large enough to admit of free drainage, without the possibility of pocketing, has been the cause of many of the failures, in dealing with intracranial suppuration.

Prognosis.—What symptoms and conditions had we in this case to guide us in a probable prognosis? The fact that the abscess was uncomplicated, either by meningitis or thrombosis, as shown by the absence of increased temperature, promised well. The increase of the optic neuritis, after the evacuation of the first abscess, although the patient was apparently improving, was discouraging, pointing towards perpetuation of the intracranial trouble. Optic neuritis should rapidly disappear after evacuation, its increase or continuation demonstrating that the cause within the cranium has not been entirely removed. This was forcibly impressed on me in one of the cases previously referred to; the patient had been operated for thrombosis of the lateral sinus and discharged from the hospital as cured; the optic

neuritis still continued, however, not increasing, but not subsiding. Several weeks later, a hernia cerebri developed, which originated from a cerebellar abscess, doubtless present at the time of the opening of the sinus.

The rapid discontinuance of the suppuration after evacuation pointed towards a favorable outcome, as it demonstrated that the surrounding cerebellar tissue was not infected, as did also the ravenous appetite, the appearance of which is usually coincident with convalescence. On the other hand, the protracted screaming fits, violence, and incontinence of urine at times made us almost despair of recovery.

AFFECTIONS OF THE FACIAL NERVE IN DISEASES OF THE EAR.¹

By DR. C. ZIMMERMANN, MILWAUKEE, WIS.

THE facial nerve becomes, by its course through the temporal bone, largely exposed to ear diseases, in which it frequently participates. Arising from the gray nucleus at the floor of the fourth ventricle, it leaves the medulla with two roots at the posterior margin of the pons, and, accompanied by the eighth nerve and surrounded by an arachnoidal and pial sheath, enters the internal auditory meatus, which is lined with a prolongation of the dura mater. Through an opening in the upper part, it passes, above and between cochlea and vestibulum, into the Fallopian canal, at the knee of which it forms the geniculate ganglion. Thence it proceeds horizontally in the inner wall of the tympanic cavity, above the oval window, in the projecting ridge of the Fallopian canal, below and in front of the horizontal semicircular canal in the floor of the aditus, where, in a second knee, it bends vertically downward and runs in the posterior wall of the external meatus to the stylo-mastoid foramen. Within the temporal bone, the facial sends off three branches: the large petrosal nerve from the geniculate ganglion, through the hiatus of the Fallopian canal in the Vidian to the spheno-palatine ganglion; the stapedius, through the canal in the eminentia pyramidalis to the stapedius muscle; and the chorda tympani, through its canaliculus, along the inner surface of the *Mt*, between hammer and long process of anvil to the lingual nerve.

¹ Read before the Wisconsin State Medical Society, June 23, 1904.

A predisposition to facial affections may be given by *anatomical abnormalities*, as the frequent occurrence of dehiscences of the Fallopian canal, especially at the projecting ridge, variations of the lumen, and thickness of its wall.

The *congenital palsies* of the facial nerve are the consequence of insufficient development of the petrous bone, and are generally associated with malformations of the external ear, parietal bones, lower jaw, and other parts of the face.¹ In a case of Marfan and Armand-Delille,² the trunk of the facial nerve was lacking. In place of the petrous bone there was only an osseous mass, without regular bone structure, no opening of the internal meatus, nor a facial canal. The seventh and eighth nerves were reduced to thin threads, and the facial consisted of a few atrophic cells, all secondary to the original disturbance in the petrous bone. Stern, however, contends that it was due to an arrest of development of the nervous apparatus, as it does not fit into the two well-known groups of congenital facial paralysis, viz.: (1) bilateral paralysis, with simultaneous paralysis of the sixth nerve and other congenital malformations; (2) unilateral paralysis, mostly associated with sensitive and vasomotor disturbances.

The *family type* of facial paralysis, associated with hemiatrophy of the face, asymmetry of the bones of the skull and face, atresia of the meatus, rudimentary auricle, is attributed by Sarbó and Sugar³ to stenosis of the Fallopian canal, owing to anomalies in the development of the petrous bone, *i. e.*, hypoplasia.

Facial paralysis was sometimes observed in affections of the *auricle and external meatus*, but more as a result of reflex, as *e. g.*, auricular herpes zoster,⁴ otitis externa (Treitel), or ceruminous plugs (Böke, Czaig). Epidermic plugs, however, may produce facial paralysis by pressure if the nerve is laid bare by atrophy and absorption of the walls of its canal.⁵

¹ Souques, Heller, Lévi, and H. de Rothschild. *Arch. f. Ohrenheilk.*, lx., 1904, pp. 308, 309.

² *A. f. O.*, liv., 1901, p. 161.

³ *A. f. O.*, lx., pp. 58 and 123.

⁴ Politzer and Tomka, *A. f. O.*, lix, 1900, p. 28.

⁵ Hessler, *A. f. O.*, xlii., p. 12; and two cases of Kirk Duncanson and Weil.

Gellé¹ described ten cases of acute subcutaneous phlegmon and œdema around the ear, forehead, and neck, with resolution after eight to twelve days without suppuration, but facial paralysis in some of them, with symptoms of deep-seated affections of the ear, probably due to osteo-periostitis of the Fallopian canal or old purulent processes.

Comparatively more frequently occurs facial paralysis in *acute affections of the middle ear*, in serous and mucous catarrh, acute serous and purulent otitis media, if, in dehiscences of the walls of the facial canal the nerve is exposed to direct pressure from the swollen mucous membrane of the tympanic cavity or accumulated exudations. Or the inflammation may be propagated to the neurilemma, with resulting perineuritis, through the vessels, perforating the bone, or by compression of the nerve by the simple congestion of the periosteum or the engorged stylo-mastoid artery in the common canal.² This may be the case even in light forms, in which the subjective symptoms of inflammations of the ear may fail to attract attention. The relapsing facial paralysis in persons with predisposition to acute angina or naso-pharyngitis, with consecutive acute otitis media, has probably its origin in the latter. Undoubtedly many of the so-called rheumatic affections of the facial nerve were of otogenous origin. Therefore the examination of the ears should never be omitted in such cases, on account of the prognostic and therapeutic importance, since paracentesis may at once relieve the affection.³

On the other hand, not every facial paralysis, in a patient who has an ear trouble, is due to the latter, as the following case of a rheumatic palsy will show:

S. E., twenty-five years old, had chronic aural catarrh from her sixteenth year, after scarlet fever. On May 17, 1903, after a week of hard work and sleeping in a room with three windows open the night before, although not directly exposed to draught, she noticed in the morning and all day a peculiar sensation in her

¹ *A. f. O.*, xli., p. 154.

² Lannois, *A. f. O.*, xli., p. 147.

³ Tomka, Bérard, Deleau, *A. f. O.*, xlix., p. 29; de Pouthière, *C.-Bl. f., Chir.*, 1899, p. 1237; Delsaux, *A. f. O.*, lx., 1903, p. 147; Damieno, *A. f. O.*, xlvi., 1899, p. 280.

tongue—i. e., she had no taste—and, toward evening, also in the right eye. The next day the right side of face was paralyzed and she experienced pain in face and ear for a week, being very sensitive to loud sounds. Faradic treatment after six months had no effect. About this time contracture had set in, for which she applied massage. After a year this contracture still persists and she cannot move that side of the face as well as the other; especially can she not chew well on that side.

The relative frequency of facial paralysis in acute purulent otitis media in children is due to the imperfect formation of the osseous wall of the facial canal and requires opening of the mastoid as early as possible.¹ Knapp saw² facial paralysis in acute purulent otitis media and mastoiditis, which disappeared by operation. In a case of Jack,³ acute purulent otitis media had led to caries of the Fallopian canal with facial paralysis, causing severe pain, but without involving the mastoid process. Entering towards the Fallopian canal, 6mm inwards from the antrum, a small cavity was reached, filled with pus, the cleaning of which removed the pain and cured the affection. Panse⁴ found in a post-mortem of a suppuration of the labyrinth after acute otitis media the auditory nerve destroyed by pus and the facial nerve infiltrated with round cells.

It will be readily conceived that the pathological changes in *chronic purulent otitis media* will give rise to facial paralysis. Here we not only find similar conditions, as mentioned under the acute form (propagation of the inflammation of the tympanic cavity through the nervus stapedius, the artery, or the chorda tympani, conveyance of pus through the eminentia pyramidalis, or from the mastoid through the stylo-mastoid foramen), but also the mucous membrane with the closely underlying periosteum may be destroyed, affecting the bone and finally the nerve. Slight facial paralysis is frequently met with in chronic ear suppurations, characterized by greater shallowness of the naso-labial fold and

¹ R. Lake, *C.-Bl. f. Chir.*, 1895, p. 814.

² *Z. f. O.*, xxviii., p. 201.

³ *Transact. of Amer. Otol. Soc.*, vol. xi., 1896.

⁴ *A. f. O.*, 1898, xlv., p. 124.

a diminished energy of the facial muscles of the corresponding side. It thus may be easily overlooked, if not especially searched for.

According to statistics by Schwabach, facial paralysis in *tuberculous* otitis media is eighteen times more frequent than in the simple form, and is an ominous symptom, as it generally precedes death shortly. The mastoid may externally appear scarcely changed, while an extensive destruction has taken place in the interior, so that the facial nerve may be paralyzed in an apparently early stage of the ear affection, and thus be of diagnostic and prognostic value.¹ Piffel² found miliary tubercles in the tissue of the denuded facial nerve, while in a case of Manasse³ complete facial paralysis with total deafness was caused by a solitary large tubercle of the pons which had damaged the auditory and facial nerves in the internal meatus.

Syphilis may also create facial paralysis by compression of the nerve at the cranial base, by gummatous meningitis, or gummata in the Fallopian canal. The paralysis which may occur in the early stage, a few weeks after primary infection, is very likely due to neuritis.⁴

The most frequent cause of facial paralysis is destruction of the Fallopian canal by *caries* and *necrosis of the petrous bone*, subsequent to chronic purulent otitis media, either genuine or induced by infectious diseases, as, besides tuberculosis and syphilis, by diphtheria, scarlet fever, measles, influenza, typhoid, leukæmia, epidemic cerebro-spinal meningitis.⁵ Here the pus breaks through the carious walls of the canal, or a sequestrum compresses the nerve, or lacerates it during exfoliation.⁶ Gerber⁷ found out of 90 cases of necrosis of the labyrinth, published up to 1903, reports on the facial nerve only in 65. In 77 % the facial nerve was paralyzed. Bezold saw it in 83 % of his cases.

¹ Milligan, *A. f. O.*, xlvii., 1899, p. 222.

² *A. f. O.*, 1900, xlviii., p. 301.

³ *A. f. O.*, 1896, xli., p. 62.

⁴ Oppenheimer, Boix, Goldflam, Balzer, and Faure-Beaulieu, *C.-Bl. f. Chir.*, 1903, p. 501; and Graenicher.

⁵ Tomka, p. 32.

⁶ Buhe, *A. f. O.*, lvii., p. 101.

⁷ *A. f. O.*, lx., 1903, p. 16.

G., however, thinks that the number of cases of lasting facial paralysis corresponds with the number of extensive necroses of the labyrinth. It generally follows the first attacks of vertigo after one or a few months, and is considered as a symptom of demarcation and migration of the sequestrum. In two exceptional cases, however,¹ the paralysis set in simultaneously with the suppuration.

New formations of the hearing organ may be further causes of facial paralysis, developing in the course of chronic purulent otitis media, as polypi, cholesteatoma, exostosis, and hyperostosis, or tumors of the petrous bone or of the cranial base, growing towards the internal meatus. In the last the facial paralysis is accompanied by nervous deafness and pontile and cerebellar symptoms.

If the facial canal is opened, the suppuration of the middle ear may be propagated to the posterior cranial cavity along the canal through the internal meatus, or to the middle cranial fossa through the hiatus of the Fallopian canal. Vice versa, *otitic cerebral complications* may damage the intracranial portion of the facial nerve, or its centres, by hemorrhages from disturbances of circulation, induced by the former, *e. g.*, thrombosis of the sinus. The complex of symptoms thus arising and the manner in which the facial nerve participates may help to determine the localization of the process. Koerner groups the facial paralysis in abscess of the brain under the following causes: 1. Lesion within the diseased temporal bone (peripheral homolateral paralysis). 2. Compression of the entrance into the internal meatus by cerebellar abscess (homolateral paralysis). 3. Distant action of an abscess of the temporal lobe on the internal capsule (crossed central paralysis). 4. Distant action of a cerebellar abscess on the pons. 5. Focal symptoms of an abscess of the pons. In both these cases, central homolateral, crossed, or bilateral paralysis.

Traumatism may produce facial paralysis, either directly by stabs, shots, foreign bodies, by fractures of the base of the skull, involving the temporal bone and the facial canal, or indirectly by subsequent hemorrhages or suppurations,

¹ Gerber and Herzfeld.

or by caustic and thermic injuries. The seat of predilection of traumatic fissure is the region of the hiatus of the Fallopiian canal.¹ The facial paralysis occurs more frequently in *fractures* perpendicular or oblique to the axis of the pyramid than in those parallel to it; it follows the fracture immediately and is complete. According to Vialle,² the secondary palsies are exceptionally rare—*i. e.*, those which, at the earliest, set in the following day, and may develop gradually or suddenly, be complete or only partial. In two of his cases, facial paralysis, which had set in on the second day, healed after twenty-seven and thirty-eight days, respectively. In such cases interstitial hemorrhages were found most frequently in the descending portion of the facial nerve.³

I observed a secondary facial paralysis, caused by the pressure of extravasated blood, perhaps from a fracture which apparently did not involve the facial canal, or from a severe contusion, in a man, aged fifty, who, on November 14, 1901, fell from the platform of an electric car on the right side of his head. He lost consciousness, but was told that much blood came out of the right ear, and, from that time, suffers from vertigo and deafness. On November 20th I saw him for the first time and found R meatus filled with dried blood and macerated epidermis. Vertical rupture of lower portion of *Mt.* (Hearing: watch not at all, tuning-fork better in right ear over mastoid. Loud voice at one foot; Rinne negative.) November 21st, quite a profuse sanguinolent discharge. November 22d, *paralysis of right facial nerve*, more pronounced in lower branches than upper. The right eye can be closed, but not as tight and energetically as the left. (*Ophth.*: myopia, conus all around; no other changes.) November 24th, perforation closed. *Facial paralysis complete.* Catheterism improves hearing considerably. November 30th: details of *Mt* can be discerned. Hearing is improving under catheterism, so that the patient gives up treatment and commences to work.

I did not see him again until May 22, 1902, when I found the *facial paralysis entirely cured* and his *hearing normal*.

¹ Zaufal.

² *A. f. O.*, lx., 1904, p. 308.

³ Barnick, *A. f. O.*, xliii., 1893, p. 37.

The facial nerve may be injured in *various operations on the ear*: in extractions of foreign bodies wedged into the tympanic cavity; in removal of polypi and granulations by the snare or sharp spoon, if the walls of the Fallopian canal are defective; in cauterizations with nitrate of silver or chromic acid; in excision of the ossicles, if the anvil does not readily follow and an infraction of the near facial canal is produced by applying too great a force to the anvil hook; in concussion by use of the hammer in mastoid operations.

If, in *opening the mastoid process*, the chisel is used beyond a certain depth, the facial canal may be injured. In this respect a great progress has been made, besides other advantages over the simple opening, by the method of Stacke, who taught how to avoid the facial nerve. Schwartze,¹ however, opposes the assertion of Stacke, that an injury of the facial nerve by his method of operating is impossible, if the Fallopian canal is intact. It is possible, without touching the medial wall of the tympanic cavity, in the descending portion of the Fallopian canal, which sometimes shows such individual variations in its course that it may be encountered where least expected. Schwartze, in a recent paper,² distinguished between two extremes—a steep or very oblique trend (“*Steilverlauf*” and “*Flachverlauf*”), and an intermediate, which he calls “*Schraegverlauf*.” The more the facial canal approaches a steep course, the less dangerous is the operation; but the more so, the more laterally the canal runs towards the meatus. Injury occurs easiest, if, in chiselling away the posterior wall of the meatus, a too horizontal direction is pursued, instead of one more upward and backward. The danger is greatest when the mastoid disease extends below the horizontal plane through the floor of the aditus ad antrum. While here the facial lies far inward from the upper portion of the tympanic margin; it passes in its downward course more or less so far laterally that it can come not only into the plane of the lower part of the tympanic margin (*Steilverlauf*), but even far laterally from the lower part of the tympanic margin (*Flachverlauf*). Another possibility of injuring the

¹ *Handbuch*, ii., p. 825.

² *A. f. O.*, lvii., 1903, p. 96.

facial nerve is more or less favored by its canal approaching more or less the surface of the posterior wall of the meatus. In one of Schwartz's specimens the facial directly touched the wall of the meatus, in another one it kept 1 *cm* distant from it. The facial can come so near to the surface of the mastoid process that it may be injured by the first strokes of the chisel. By what these anomalies are caused and from what symptoms they may be anticipated before the operation, are still to be elucidated by further researches.

Streit¹ recently described a case of oblique course with unusually marked displacement of the descending portion of the facial nerve towards the surface of the mastoid process, which throws some light on this question. The facial crossed the upper part of the tympanic sulcus, with the posterior periphery of which its farther course formed an acute angle downward and forward. The sulcus was very oblique, without marked vertical inclination. S. attributes to this latter condition the displacement of the nerve into the posterior wall and advises a certain caution in removing the posterior wall, if the plane of the *Mt* is *very oblique*.

B. A. Randall,² from his mensurations of a great number of skulls, came to a somewhat different conclusion, viz., "that the descending course of the facial nerve to its stylo-mastoid exit is, in all cases studied, almost exactly vertical and crosses the oblique plane of the *Mt* some 3 *mm* back of the middle of the posterior margin of the annulus. Therefore, in removing the back wall of the meatus we should aim to cut a little below the tympano-mastoid suture if we would keep in safe territory."

Schwartz recommends the following *precautions*, with regard to these abnormalities: Careful slight strokes of the chisel, which must form an acute angle with the posterior wall, never a right angle. Then the facial cannot be cut perpendicularly. The chisel must act as bone knife, not as lever, and only with the centre of its groove for removing the bone in lamellæ.

Stacke, however,³ concedes that facial paralysis may be

¹ *A. f. O.*, lviii., p. 233.

² *ARCH. OF OTOL.*, 1903, p. 144.

³ *Die operative Freileg. der Mittelhörtracume*, pp. 191, 193.

unavoidable in caries of the Fallopian canal. In such cases he, in concordance with Schwartz,¹ Moure and Liaras,² Stewart,³ Panse,⁴ and others, does not shun a lesion of the nerve, in the interest of removing all diseased parts.

These conditions I found in the following cases:

March 16, 1901.—M. R., a man, aged forty-three, came to me on account of a very profuse purulent discharge of right ear with excruciating headache on the same side. The otitis media had developed five weeks ago after influenza. Perforation at upper posterior quadrant of *Mt* through which a granulation projects, pus coming from above. Mastoid not swollen nor painful. Bone at posterior portion of annulus tympanicus feels rough. The muscles of the corresponding side of the face show lack of energy.

March 17th.—Opening of mastoid, which is filled with granulations. Perforation of *Mt* enlarged and granulations removed. The patient felt greatly relieved and had no headache. March 23d, at the first dressing, the mastoid wound was clean, but the ear contained pus and he had some pain in ear, neck, and jaw. There was no open communication between ear and mastoid. Dressed every day, but since the discharge from ear continued, the *radical operation* was performed March 26th. The lateral wall of aditus and the innermost portion of meatus formed a loose large sequestrum which showed the lateral half of the facial canal. Behind it, quite an accumulation of pus had taken place. The tegmen tympani was healthy. Complete facial paralysis, although no twitchings were observed during the operation. Undoubtedly it was torn by the sequestrum when this was extracted. At the dressing the next day not a drop of pus was found. Everything went well until, on April 4th, the patient suddenly complained of pain in left leg during the night, had a chill at 10 A.M. and severe headache, temp. 99.5°. In the afternoon he lost consciousness and presented the picture of acute purulent leptomeningitis, of which he died the next evening. A post-mortem examination was not consented to.

Since all the diseased parts had been removed, the apoplectiform fatal meningitis was very likely metastatic,

¹ *A. f. O.*, lvii., 1903, p. 96.

² *A. f. O.*, xlix., 1900, p. 86.

³ *A. f. O.*, xlvi., 1899, p. 59.

⁴ *A. f. O.*, lviii., p. 190; xlv., 1898, p. 124.

analogous to a great number of similar cases, published by Ray, Panse, Knapp, Abbe, Kretchmann, Koerner, Zaufal, and Piff.¹

Second case :

A. P., aged seventeen, came to me January 5, 1893, with chronic purulent otitis media and polypi of left ear, caries of mastoid with intense swelling and fistulæ, severe pain, fever, and occasional twitchings in the corresponding side of the face. At the operation the following day, a very large and deep cavity, filled with granulations, was opened. The posterior wall of the meatus was necrotic and had to be removed, which resulted in complete paralysis of the left facial. Good recovery.

January 27, 1894, he can close the left eye, but, on irritation of the conjunctiva, it weeps more than the right eye, which showed a restoration of the lachrymal fibres of the facial nerve.

With regard to the *symptoms of facial paralysis*, only a few remarks may be permitted.

Obliquity of the *soft palate* is no evidence of facial paralysis, as it is not uncommon in persons who have no facial palsy. Gowers, *e. g.*, never observed a corresponding defect of movement in the palate, and from the physiological and pathological investigations of Vulpian, Lermoyez, Réthi, Eulenburg, and de Pouthière, we know that the palate is innervated by motor branches of the fifth, tenth, and eleventh nerves.

The *pain in the face*, generally felt after the onset of facial palsy, was formerly attributed to assumed sensitive fibres of the facial nerve, but is now ascribed to a simultaneous, probably neuritic, affection of branches of the fifth nerve.²

If the facial nerve is diseased between the origin of the chorda tympani and the geniculate ganglion, *taste* is lost in the anterior part of the tongue on the affected side. From recent studies in the clinic of Koerner, Schlichting³ concludes that the chorda fibres of taste of the anterior part of the tongue show an individual variation of occupying $\frac{1}{3}$ to $\frac{2}{3}$

¹ *A. f. O.*, li., 1901, p. 172.

² Oppenheimer, Hammerschlag, *A. f. O.*, xlv., 1; Hofmann, and v. Frankl-Hochwart.

³ *Z. f. O.*, xxxii., 1900, p. 307.

of the area of the tongue. The posterior part of the tongue and the soft palate are supplied from the tympanic plexus. All nerve fibres conducting the sensation of taste to the centre pass through the tympanic cavity, no matter whether they finally reach the brain through the fifth or ninth nerves.

If the facial nerve is affected at or above the geniculate ganglion, the secretion of the *lachrymal gland* ceases. Goldzieher¹ has shown that the facial nerve innervates the lachrymal gland by fibres which course in the large petrosal nerve (to the sphenopalatine ganglion, by the subcutaneous malæ of the second branch of the fifth nerve, and the constant anastomosis with the lachrymal nerve to the lachrymal gland), and causes reflex and emotional weeping, while the regular moisture of the surface of the eye is secreted by the conjunctiva.

Tribondeau² proved, by cutting the facial nerve in animals, that it is the only innervator of the lachrymal gland, and his results were confirmed by Laffay.

Facial paralysis, occurring during an operation, is generally not noticed as long as the patient sleeps, both eyes being equally closed. Herzfeld³ maintains that closure of the lids during sleep is not always brought about by active contraction of the orbicularis, but passively by relaxation of the tonus of Müller's muscles and the smooth muscular fibres of Tenon's capsule, both supplied by the sympathetic nerve, analogously to the contraction of the pupil during sleep from relaxation of the dilator, which is also supplied by the sympathetic.

As to the *prognosis of facial paralysis* after operations, there is some discrepancy of opinion. According to Lermoyez,⁴ a paralysis following immediately an operation is incurable, those occurring after one or a few days are caused by grazing the nerve with the instruments, or pressure from blood- or wound-secretion, or too tight packing, and are curable (Koerner observed this in three cases, also Gruening,

¹ *A. f. O.*, Aug. 28, 1899.

² *Jrnl. de méd. de Bordeaux*, 1895, No. 44.

³ *Berl. klin. Woch.*, 1901, No. 35, p. 904.

⁴ *Thérapeutique des maladies de l'oreille*.

Bacon, Dench), while Stacke says that a facial paralysis created by sharp instruments is very rarely irreparable. Out of his one hundred radical operations published in his book, facial paralysis occurred in four, but was cured in all; out of Moure's¹ thirty-four operations, it occurred four times and healed in all. Castex² observed restoration in three out of four cases. Barnick,³ Botey,⁴ Schroeder⁵ had, out of 130 ossiculectomies, twice facial paralysis, which, like in all cases previously published, recovered in about six weeks without treatment. He thinks that the paralysis is caused by infection. A certain prognostic information on facial paralysis in general is obtained by electricity. If at the end of ten days the irritability of the nerve is not below normal, the face will probably be well in a few weeks. If, on the other hand, at the end of a fortnight the irritability of the nerve is absolutely lost, the paralysis will certainly last for several months.⁶

The *treatment* of facial paralysis from ear disease coincides with the treatment of the latter, and, as shown above, must be chiefly surgical, aided by electricity, if there is no contracture. Brieger⁷ observed nine facial paralyses in 169 radical operations. One case illustrated the possibility of regeneration of the nerve six years after it was cut in simple opening of the antrum, by totally removing all diseased parts and curing the affection.

I may here mention the following case which I described in the ARCH. OF OTOL., xxiv., No. 4:

A man, aged twenty-six, had a large cholesteatoma of right middle ear and posterior cranial fossa with complete facial paralysis. Radical operation November 1, 1898. The inner portion of the posterior wall of the meatus formed a loose sequestrum which presented a semi-canal, apparently the lateral portion of the Fallopian canal. The after-treatment up to complete

¹ *C.-Bl. f. Chir.*, 1897, p. 110.

² *A. f. O.*, xlix., 1900, p. 278.

³ *A. f. O.*, xlii., p. 112.

⁴ *A. f. O.*, xlv., p. 73.

⁵ *A. f. O.*, xlix., 1900, p. 21.

⁶ Gowers, *Manual of Nervous Diseases*, ii., p. 346.

⁷ *A. f. O.*, xlix., 1900, p. 282.

epidermization, lasted six months. The facial paralysis was cured; he can close his right eye completely, only the folds of the face on that side are not as deep as on the other.

For *incurable facial paralysis* Faure and Furet devised, in 1898, a new treatment by uniting the distal end of the facial with the external branch of the spinal accessory at its entrance into the sterno-mastoid muscle. This method has been further pursued by Kennedy, Breavoine¹ Korte, Cushing, Frazin, Spiller, who favored the hypoglossal nerve, Balance, and Stewart.² The results were restoration of the normal muscular tone, improvement in the symmetry of the face, and restoration of voluntary control of various individual muscles.

¹ *C.-Bl. f. Chir.*, 1902, p. 796.

² *Prog. med.*, March 1, 1904.

REPORT OF THE TRANSACTIONS OF THE NEW
YORK OTOLOGICAL SOCIETY; MEETING
OF MAY 24, 1904.

By DR. ARNOLD KNAPP, SECRETARY.

THE PRESIDENT, DR. EMERSON, IN THE CHAIR.

Dr. BRANDEGEE asked the opinion of the members of the Society whether they had heard of any **fatal cases following skin grafting in the radical operation**. He had been told that some fatal cases had occurred in the city. He was very anxious to know the particulars, inasmuch as they had been doing a great deal of skin grafting at the Infirmary and were very much impressed with the advantages of this method. Not only was the healing very much shortened, but the hearing was improved.

Dr. GRUENING spoke of a case which he had heard of where a graft had been placed directly upon the sinus. Death subsequently occurred, due to pyæmia, and it was supposed that sinus thrombosis was induced by infection from the skin flap. He himself was in the habit of placing a skin graft only over the opening of the Eustachian tube, and found this to be a very important step to shorten the healing process.

Dr. WHITING had had only favorable results from skin grafting, though he was not convinced that the healing had been very much shortened.

Dr. ARNOLD KNAPP thought that the fatal termination of these cases could hardly be ascribed to the grafting procedure, as unquestionably disease must have existed beyond the seat of the primary operation, and the graft had probably not acted in any other way than tight packing. It is of course well known that a graft placed upon an unhealthy surface does not take.

Dr. GRUENING thought it was questionable whether a graft should be placed upon the dura or upon the sinus.

Dr. KIPP spoke of a case of **sepsis from empyema of the nasal accessory cavities complicated with acute Bright's disease**. The patient, forty-five years of age, came to him complaining of deafness. The right ear had been deaf for some time, the left had become affected recently. On examination, the right drum was thickened, and looked like skin and protruded slightly. In the left the appearances were those of an acute otitis media. Paracentesis evacuated a milky fluid from the right, serous fluid from the left. The patient also suffered from an occlusion of the nose due to hypertrophic rhinitis. He improved for three weeks, then began to look badly. His temperature varied between 99° and 103°. This continued for two weeks, without any symptoms of mastoid involvement, the right ear discharging slightly, the left considerably. The man then grew worse; at one time the pulse went down to 45, temperature rose to 103°. His nose was examined by a well-known rhinologist, who found ethmoid disease present, but drainage was free. As the temperature continued, Dr. Kipp opened the left mastoid and found pus in the antrum and mastoid—no disease of the lateral sinus. Two days later he opened the right mastoid but found no pus. The patient became very much worse some days after the operation, and a week later developed an acute attack of Bright's disease. He had several attacks of bleeding from the nose. The face became swollen, the ocular conjunctiva œdematous. The patient died of œdema of the lungs. Autopsy revealed a perfectly normal brain; the dura and the venous sinuses were unaffected. There was no discoloration of the inner surface of either temporal bone. The roof of the accessory nasal cavities was removed and all of the cavities of both sides were found lined with thick pus; both sphenoidal sinuses were filled with pus. There had been no symptoms pointing to the nasal complication beyond the discharge from the nose and the fever. The sella turcica was soft and hemorrhagic. The eyes were normal.

Dr. BERENS thought that in the presence of pus and sepsis, without any indication of mastoiditis, the nasal sinuses should have been opened, especially in conjunction with œdema of the conjunctiva. He had recently operated upon fourteen cases of sphenoid disease and had found the ethmoidal and sphenoidal sinuses affected in all.

Dr. HARRIS thought this brought up again the interesting connection between diseases of the accessory nasal cavities with diseases of the ear.

Dr. PHILLIPS thought that Dr. Berens's statement should perhaps be modified, inasmuch as pus coming posteriorly from the nose indicates either ethmoid or sphenoid diseases, or both.

Dr. BERENS replied by saying that in his experience they were always combined.

Dr. PHILLIPS remembered having seen many cases where the ethmoid alone was affected.

Dr. KIPP emphasized the fact that at the autopsy both frontal sinuses were also found involved, though no symptoms of their involvement were present before death.

He also spoke of the autopsy of a case of frontal-sinus disease complicated with pneumonia, where the autopsy showed that all the sinuses on one side of the nose were converted into one large cavity.

Dr. COWEN spoke of a patient who had received some intranasal treatment and exhibited distinct pyæmic symptoms. An exophthalmos was present, with all the symptoms of an orbital cellulitis. At the autopsy, all of the nasal cavities were found normal, but the cavernous sinus was thrombosed.

Dr. PHILLIPS spoke of the present **epidemic of cerebro-spinal meningitis**. He said that there were between 50 and 100 fatal cases a week, according to the Board of Health reports, and without question we would find a great many cases of deafness following this present epidemic. He had just seen a very recent case. He asked the opinion of the Society as to what could be done in the early stages of the aural complication.

Dr. GRUENING remembered the epidemic which occurred thirty years ago, when a great number of cases were observed and treated in the New York Ophthalmic and Aural Institute. The deafness was treated with considerable enthusiasm by electricity, until an autopsy showed that the auditory nerve was infiltrated with pus, *i. e.*, an actual purulent neuritis, showing that no treatment could be of any avail.

Dr. PHILLIPS mentioned that lumbar puncture was generally practised in these cases, and that the meningococcus was obtained. He thought this of some interest, because these organisms when met with in the mastoid were usually more or less benign.

Dr. KIPP said that cerebro-spinal meningitis was liable to cause any kind or variety of aural lesion, just as in the eye.

Dr. H. KNAPP thought that a purulent inflammation of the labyrinth was the pathological change, and that the patient was always totally deaf.

Dr. GRUENING recently examined fifteen cases at the Mount Sinai Hospital. In one case one eye was completely blind, with no fundus changes. In the other eye, though the vision was reduced, the field for white and colors was normal. A paralysis of all the external and internal muscles existed.

In three other cases he had found optic neuritis. There were no other symptoms in the other patients. The ears were found normal in all.

Dr. H. KNAPP drew attention to the fact that the deafness was generally binaural, while the eye lesion might be single, either in the optic nerve or a metastatic choroiditis, when the eye always became blind.

Dr. KIPP thought that the staggering gait which remained so long after cerebro-spinal meningitis was unusually typical of the disease.

Dr. WHITING exhibited a temperature chart of a pyæmic character of a patient one year of age whom he had seen on the third day of the disease. Both ears were suppurating. Paracentesis had been made. There was a slight sagging of the canal wall. He advised enlarging the paracentesis opening. The temperature then varied between 106° and 98.5° daily for ten days, a period which surely would speak for early operation. The high temperature was sometimes in the morning and sometimes in the afternoon. There was no excessive discharge from the ear, bacteriologic examination was negative, pulse varied between 100 and 150. He refused to operate, because the child to him never appeared to be really very ill. There were no special sagging of the wall and no mastoid symptoms. The child got well. The blood was not examined.

Dr. GRUENING had had a similar experience after a radical operation on a child, when the temperature varied between 106° and 98° . On examining the blood, the plasmodium was found present, which accounted for the irregular fever, though unquestionably it can be produced by septic absorption from the tympanum.

Dr. COWEN said that the diagnosis of a disease spoken of as

"gland disease" was becoming quite popular among physicians and was apt to confuse the ear symptoms. It always occurs after infectious diseases. He remembered a case when after pneumonia the ears became involved, the mastoids were somewhat tender, and the drums red. The patient recovered after three weeks. The cervical glands and spleen were enlarged.

Dr. HARRIS spoke of the great similarity of the cases of irregular temperature, like the one which Dr. Whiting reported, to those of jugular-bulb thrombosis which Dr. McKernon had recently reported to the Society.

Dr. TOEPLITZ spoke of the connection of the **supramastoid glands with ear disease**. He had recently observed a case where on one side the supramastoid gland was involved and the underlying mastoid was also diseased; another case where the gland was involved secondarily to a cellulitis of the scalp without any mastoid development; and thirdly of the affection of this gland in the cases known as German measles. He said that clinicians often found a swelling of this gland as a forerunner in the beginning of a rubeola.

Dr. GRUENING spoke of the case of a child two months old, with apparently a suppurative gland situated somewhat lower on the mastoid than usual, with a temperature of 102° . After evacuating a glandular abscess, he found the periosteum clean, and on dividing it a part of the mastoid cortex was lifted up and an enormous abscess cavity was discovered. On the other side apparently only a suppurating gland existed. He remembered, nevertheless, the frequency of binaural affections of this kind, and also operated on the mastoid and found it very much affected.

Dr. ADAMS spoke of a case of ear trouble after measles in which the temperature ranged from 104° to 98° and where the glands under the mastoid were involved. The case got gradually well.

Dr. HERMAN KNAPP spoke of two children whom he had had in charge, who from time to time exhibited pyæmic symptoms. He thought that they would both get well, and said that in his experience sinus thrombosis was very rare in children.

Dr. GRUENING replied that he had observed during the past winter three cases of sinus thrombosis in children, one of two and the remaining two of three years of age.

Dr. SHEPPARD remembered having operated upon three children with sinus thrombosis, who were all under the age of

seven, where the jugular vein was ligated. The patients all recovered.

He also spoke of a patient of fifty-five years of age who came to him suffering with a violent middle-ear inflammation. The membrane was immediately freely incised, but as there was no amelioration of symptoms after twenty-four hours, operation was recommended. The next day the pain and tenderness had almost disappeared, but there was very great general depression; this latter rapidly increased, and the man became markedly septic, with, forty-eight hours later, a temperature above 105° , with moderate variations, free sweating, but no chills. These symptoms continued to the time when he finally consented to operation—exactly a week from the original paracentesis. He had expected that the lateral sinus was involved and was prepared to expose it, but on opening the mastoid the diseased process was so extensive, and the patient bore the operation so badly, that he contented himself with a thorough clearing out of the mastoid and adjoining occipital cells; the expectation was that in twenty-four or forty-eight hours he would continue the operation, but within twenty-four hours the temperature dropped to normal and the patient made an uneventful recovery.

Dr. GRUENING spoke of a case of **sinus thrombosis** in a girl of sixteen years of age whom he had formerly treated for a discharge from the ear. He had removed a carious hammer and some cholesteatoma. The discharge ceased, and, as she had no symptoms, he asked her to report if she had any further ear trouble. He was recently called to see her. She had been ill for two weeks, had had a chill, and vomited, with high fever, and involuntary urination. She had been treated for various ailments until the family remembered that she had had trouble formerly from her ear, and so he was called in. He found the patient to be distinctly septic, with a pulse of 160, with optic neuritis, no discharge from the ear, but a slight puffiness above the auricle. At operation a fistula was found below the suprameatal spine from which a large quantity of pus was discharged. This led into a large cavity within the mastoid. After cleaning out the cavity, he found that the outer wall of the sinus was defective and appeared to be shut off above and below by a firm thrombus. He removed the thrombus below and restored the circulation, but had to proceed as far back as the torcular to produce bleeding from the other extremity. The thrombus in this part of the

lateral sinus was found purulent in places. In one place in particular the disintegration of the thrombus looked exactly like brain tissue. The antrum was cleaned out and the operation completed. The patient has recovered.

Dr. KIPP spoke of the sloughing of the outer wall of the sinus as occurring in the form of a spontaneous cure of sinus thrombosis. He spoke of a patient with a subcutaneous abscess back of the auricle, which led down into a large cavity in the mastoid containing some pus. The outer wall of the sinus was found defective, and the sinus both above and below was firmly closed off. The patient showed no evidences of pyæmia, and made a perfect recovery in a short time. The process could be regarded as a spontaneous cure.

Dr. WHITING thought that this condition of deficient outer wall could not be very rare. He himself had seen five cases where the parietal wall of the sinus had disappeared. This had always occurred in the part of the sigmoid sinus between the two knees.

REPORT OF THE TRANSACTIONS OF THE SECTION ON OTOTOLOGY OF THE NEW YORK ACADEMY OF MEDICINE.

MEETING OF APRIL 14, 1904. DR. H. KNAPP IN THE CHAIR.

EXHIBITION OF NEW INSTRUMENTS.

Dr. BRYANT submitted a new **long-handled gouge** with curve forward near its point. This gouge is commonly used in wood-carving, and is known as the front-bent gouge. The instrument can be used with a mallet in the ordinary way, or it can be worked with the hand alone. It is useful in mastoid work, for it facilitates the removal of the hard structure lying within the process, the curve in the instrument allowing its use in places not readily reached by a straight instrument. It is also useful in cutting over the outer table of the skull over the mastoid process and, instead of the trephine, to perforate the calvaria. The perforation of the outer table is made by using the instrument as a gimlet until a shallow cup is formed. As the hole deepens, the instrument is swung more widely, cutting the sides and bottom of the opening at the same time. The instrument is not equal in efficiency to the rongeur forceps for enlarging a hole, nor is it as effective as a curette in removing the pneumatic cells of the mastoid, but it is more eminently adapted for precise work in localities requiring cautious manipulation, for it allows the operator to exert considerable force with precision at the desired point. It also has the advantage of doing away with blows of the mallet in cranial work.

PRESENTATION OF CASES.

Dr. TOEPLITZ presented a case of **extradural abscess, simulating cerebellar abscess ; operation ; recovery.**

The patient was a man, twenty-two years of age. He was

taken with cold and sore throat on December 14, 1903. On the 15th he had pain in the left ear, and on the 16th Dr. Toeplitz saw him at the Post-Graduate Hospital, where he performed a paracentesis. The pain was not relieved by this measure. When he saw him again, on the 19th, the patient complained of pain in the left mastoid. He was then sent to the hospital. There was considerable discharge, which was not purulent in the beginning. The ice coil was used for two, and the hot-water bag for three days. The temperature, which for four days had been 100.6° , dropped and remained at 99° for three days. On the seventh day after his admission to the hospital, the patient's pulse was 74-80. On that day, being convinced that there was some caries going on in the mastoid (although he had no positive sign for operation), the Doctor operated. The antrum was filled with viscid fluid. The tip and the lower posterior mastoid were carious, and there was a large mass of dirty granulations in the tip and on the posterior wall of the mastoid. No pus was found in the mastoid at the time. The mastoid was entirely shelled out, only the inner plate being left. On the 27th, the temperature rose to 103.8° , and the pulse was 80; on the next day (the 28th), the temperature went down to 99.2° , pulse 80; on the 29th, the temperature was 102.6° , pulse 80; on the 30th, 100.1° , pulse 80. On the sixth day, the temperature was normal. The patient vomited during the night and complained of pain in his arms and legs. The blood was examined for malaria, but the result was negative. Widal test negative. There was pain in the abdomen and considerable hemorrhage from the intestines. Leucocyte count was 7500. The analysis of the stomach showed an absence of hydrochloric acid and pepsin. Severe intestinal hemorrhages continued. Leucocyte count two weeks after operation was 30,000.

The eyes were normal, as was also the sensorium.

There was some subnormal temperature just before the second operation, and elevation of the pulse at the same time. Owing to the poor condition of the man, it was deemed best to look for the suppuration—which was probably located in the cerebellum. Dr. Toeplitz operated upon him again on January 10th, two weeks after the mastoid operation. He worked his way around the sinus and searched the cerebellum and temporo-sphenoidal lobe with exploratory needle. He then found above the sinus an extradural abscess, which was not very large, but the entire bone

was diseased around it. During the operation the pulse became so weak that a saline infusion of 1500 cc, with adrenalin, was necessary. After the operation, the temperature was between 102° and 103° the first week, the pulse 116; second week 101°-100°. It was normal two weeks after the operation. January 27th, the hemorrhage ceased. It was ascertained that the man had syphilis two weeks before he was operated. The urine showed suppuration from the kidneys just before or immediately after the first operation. There were pus cells and hyaline cylinders and albumin. This suppuration from the kidneys has continued until to-day. The patient made an otherwise favorable progress up to February 20th, when the temperature began to rise to 100° and the pulse from 100-112. The temperature remained at about 100° for a week. At the end of the week, on February 27th, at 1 P.M., the patient was seized with an attack of convulsions, which lasted five minutes, and were most pronounced on the left side of the face and extremities, the side on which he had been operated upon. Forty-eight hours afterwards, he had another attack of convulsions, with unconsciousness, lasting five minutes, and also mostly confined to the left side. On February 29th, he felt well, but albumin and pus cells were still present in the urine. He was discharged three weeks afterwards, and has had no attack since. The wound is now entirely closed, with the exception of a small opening, which will be closed very soon. He has gained thirty-five pounds since he left the hospital.

Dr. LEDERMAN presented a case that he had exhibited at a former meeting, a colored woman, who, three years since, had been shot at close range right above the tragus with a 32-calibre revolver, the bullet remaining in the ear until a few days ago, when it was removed by Dr. Lederman with the radical operation. The specimen was exhibited. The bullet had struck the petrous portion of the temporal bone and was deflected downwards. When the patient presented herself for examination, it was impossible to detect anything on account of the large fibrous mass in the canal. This mass was removed, revealing a black substance, which proved to be the lead bullet imbedded in the internal wall of the middle ear. The obstruction could not be budged through the canal, so the patient was advised to remain in the Manhattan Eye and Ear Hospital to have it removed. While she was under the anæsthesia Dr. Lederman again endeavored

to loosen the bullet through the canal, but failing to accomplish this, did the Schwartz-Stacke operation. A blackish discoloration was found on the outer wall of the mastoid; this was a little lead, and had to be chiselled away. The patient still had some remnants of facial paralysis, which had existed for three years. She claims that at the time of the accident she was unconscious for one month. She was troubled with vertigo for some time afterwards. The lead extracted from the ear weighed seventy grains. The patient had made a very favorable recovery; the outer wound is practically healed, the vertigo is much better, and her general condition and hearing are much improved.

Dr. CHAMBERS was reminded of a case which he had reported before the Section several years ago: a man attempted to commit suicide. The bullet went along the canal wall and embedded itself in the internal ear. The Schwartz-Stacke operation was done. An effort was made to remove the bullet, but it was found to be too deeply implanted in the bone. It was decided to leave it. The man did very nicely, but without hearing.

Dr. BERENS presented a case of a **radical operation for epithelioma of the middle ear**. The patient, twenty-nine years of age, had suffered from suppuration from the right ear since early infancy. He came to the hospital on February 16th with the history of having had a mass of granulations removed from the external auditory canal by a house surgeon in one of the hospitals in the suburbs. There was extreme tenderness over the mastoid. The radical operation was performed by Dr. Berens, who found the whole of the posterior bony wall gone, as well as most of the anterior wall, and practically all of the inner bony wall. The membranous canal was affected within the bony canal. It had necrosed. The antrum, attic, and middle ear were filled with the granulating mass. This extended down into the mastoid cells, through the antrum. The cortex was eburnated. The disease had attacked the bone around the canal. There was a fistulous tract leading through the anterior wall through which a probe entered the supratonsillar space. The microscopical report by Dr. Jonathan Wright is "probable epithelioma." This diagnosis seems to be substantiated by the fact that there is now a probable return of the trouble in the middle ear. It is to be allowed to grow before being submitted to another examination.

Dr. DENCH spoke of a case of **fibrosarcoma of the middle**

ear upon which he had operated. In this case complete recovery took place, and the patient remained well for at least two and a half years after the operation; since this time he has not reported at the clinic. The recovery in this case was somewhat remarkable, inasmuch as the dura was found to be involved at the time the growth was operated upon. The ordinary radical operation was done for the removal of the growth.

Dr. DENCH also spoke of another case of **sarcoma of the middle ear**, reported about a year ago; the patient was an infant of about eighteen months; at the time of the first examination, a mass of firm granulation tissue filled the middle ear and external auditory meatus. There was also some post-aural œdema. The typical mastoid operation was performed, and a mass of granulation tissue was found protruding through the mastoid cortex. All this granulation tissue was removed by means of the curette, and the destruction of the mastoid was found to be very extensive. An examination of the tissue removed showed that the growth was a sarcoma. The ear was temporarily relieved by the operation, but the growth soon recurred in the wound. Later the growth was treated by means of the X-ray apparatus, and this seemed partially successful, inasmuch as cicatrization of the wound took place rapidly; in spite of this fact, however, the growth still continued to increase in size, and later the common carotid was ligated in the hope of controlling the rapid advance of the malignant disease, by shutting off the blood supply from the part. This procedure did not seem to inhibit the growth in the slightest degree. One of the symptoms which led the author to suspect a malignant growth in this region, when the patient first came under observation, was the fact that there was paralysis of the external rectus upon the side corresponding to the growth. As such a condition is extremely rare after an acute inflammatory process within the mastoid, malignant disease was suspected from the very first time the patient was seen. During the last few months that the patient lived, the growth spread rapidly, involving the Eustachian tube, the lateral wall of the pharynx, and the tonsil. The patient finally died and no autopsy was obtainable.

Dr. WHITING cited two cases of the character of those referred to by Dr. Berens—cases of epithelioma which had their origin in chronic suppuration of the middle ear. Both patients died, one in about a year and the other in six months. The case which

died after the briefer interval presented some interesting features which Dr. Whiting had reported upon another occasion. For the growth subsequent to the mastoid operation he did an operation similar to the one described by Dr. Dench. The growth subsequent to the mastoid operation was extremely rapid—the mastoid wound was healed in about two weeks. It remained closed for ten days, when it became infiltrated, softened, and broke down. The granulations of this cauliflower mass protruded from the inside of the original scar, and also from the orifice of the meatus, in such a manner that the two masses grew together across the auricle of the ear. The cauliflower granulation was the size of a man's fist. It bled profusely on the slightest touch. The patient expressed the wish that the entire mass should be amputated. She was told that such a proceeding would probably be of little or no advantage, but, as she insisted, Dr. Bolton agreed to perform the operation. He tied the common carotid first, and simply sliced the thing right off even with the head. Such a hemorrhage followed as is seen only from a sigmoid sinus, when the jugular vein is cut open. Artery clamps were put around the edges, and after a momentary control of the hemorrhage he took a large cautery which was at hand and applied it as quickly as possible, thus controlling the bleeding.

The patient was much gratified with the procedure. She felt pretty well for four or five days. She rose from her bed in the hospital (Bellevue) and started to walk across the room—she fell dead to the floor.

Dr. HASKIN spoke of a case of epithelioma which he had reported before the American Society at Washington two or three years ago. The case came into the clinic at the Manhattan Eye and Ear. The woman presented a large granuloma extending from the middle ear, with a very offensive discharge and considerable pain. The Doctor operated with a snare, took off a tumor, and had it examined. It was pronounced simply granuloma. When it reappeared the patient was advised to submit to the radical operation. The whole mastoid region was found filled with a black granular mass, which was removed. The whole of the mastoid was removed and a great portion of the dura later laid bare. The whole bony portion of the canal had been destroyed by this same growth. The pathologist pronounced it an epithelial tumor—probably not malignant. The wound did not progress very satisfactorily after treatment for some time, so

it was re-examined, when it was pronounced epithelioma. Another operation was not done on the patient. Five or six months afterwards she presented very much the same appearance that Dr. Whiting had described. The cauliflower-like mass destroyed the appearance of the auricle. The patient finally died.

Dr. TOEPLITZ cited a case he had seen about five years ago, with a return of the mass of granulations in the external meatus. As soon as they were removed they returned—which one feature made the Doctor suspect a malignant growth. The patient, a man about fifty years of age, was operated upon. On opening the cells, it was found that everything was destroyed—the cells and the middle ear; all the bones were broken down, and the whole cavity, as far as the dura mater, filled with these masses. The man died from exhaustion about four months later.

Dr. H. KNAPP spoke of a case he had seen in consultation with Dr. KIPP—a sarcoma in the middle ear. After a second or third relapse it was radically removed, and has not returned in these three years.

Dr. WHITING read a paper entitled, "A Contribution to the Surgical Pathology of Mastoiditis."

Discussion.—Dr. DENCH said he felt like voicing everything said by Dr. Whiting in his paper; he considered it important in all cases of mastoiditis, to do a thorough and complete operation, and he agreed with the author that it was impossible, after opening the mastoid process, to tell exactly when to stop the removal of bone. The only safeguard to the patient was the absolute destruction of the entire pneumatic structure of the mastoid, no matter to what extent it might be necessary to uncover the bone in order to effect this. He did not think that the time required for the healing of these wounds was at all proportionate to the amount of bone removed. In many of the cases which had come under his observation, recovery had been much more rapid where there had been complete removal of the bone, than in other cases where not so much bone had been removed. In order to secure a rapid convalescence, it was necessary to entirely obliterate the pneumatic structure. He also believed that the scar resulting from even an extensive mastoid operation was but slightly noticeable, provided prompt healing of the wound took place.

The speaker believed that Dr. Whiting's paper furnished important points which should be observed by all; that is, in every

case of mastoiditis, it was important to do a complete operation, and to be certain that no cell was left which might contain a focus of pus, and which might later infect the intracranial structures.

Dr. MCKERNON said that he had little to add—more than a hearty endorsement of the views expressed by Dr. Whiting. It had been his good fortune to begin his operative mastoid work after the dictum of Dr. Gruening, which was, that the tip should be removed in every case, as well as clearing out the mastoid antrum and the cellular spaces. The complete extermination of the zygomatic root had been developed and elaborated very much during the past two or three years—as little or nothing was mentioned about this particular portion of the mastoid up to that time. In the majority of cases he believed it quite as important to explore the large cellular or medullary spaces which are posterior to the sigmoid groove, as it was to uncover and explore those cellular spaces along the zygomatic root; for, many times when there was little or no evidence of pus in the mastoid antrum or at the zygomatic root, it was very frequently found that these spaces were completely infiltrated, and if left untouched a focus remained for further infection in the future. He thought that operators should be guarded as far as leaving a mastoid insufficiently done was concerned, for, if previous to operation there was marked evidence of pain, and this pain was well posterior, the majority of the trouble would be found here and not in the antrum or tip. He had seen many cases where the mastoid structure had been completely uninvolved, and yet, when the bone posterior to the sigmoid groove was uncovered, space after space was found filled with pus and granulation tissue.

Dr. WHITING, in conclusion, said he thought Dr. McKernon's observations bore out in a very flattering manner one of the chief points which he had endeavored to emphasize in his paper: that the antrum being the centre of distribution for these infective practices, extension may take place—*not* by immediate contiguity of tissue, but by remote extension of contiguity of tissue.

MEETING OF MAY 12, 1904. THE PRESIDENT, DR. H. KNAPP, IN THE CHAIR.

PRESENTATION OF CASES.

Dr. RICHARDS exhibited a case of **lateral sinus and jugular thrombosis**, upon which he had operated and in which there

had been a favorable recovery. Prior to the operation, there had been neither remitting temperature nor chill to indicate the condition afterwards discovered. The chief thing which pointed to its existence was beginning papillitis in the opposite eye. Four years ago this same ear was the seat of acute middle-ear suppuration—with apparent complete recovery at the end of ten days. About ten months ago he had a repetition of the same trouble, which continued for three weeks and then apparently ceased. On cessation of the discharge, the patient suffered pain in the mastoid region. There was also some vomiting. On examination, the drum was found to be pale, there was a small perforation, with scarcely enough non-fœtid pus in the canal to cover the end of a cotton applicator. Upon firm pressure on the antrum, tenderness was moderate; over the tip, it was more marked; the suboccipital region was negative. The temperature at this time was a trifle over 99°, the respiration and pulse being in accordance. Operation was advised; it was performed on the following day. The cortex on removal was thin; when it was removed, pale granulations appeared. A radical operation was performed. There was no visible pus present anywhere. The disease had eroded the overlying sinus, the vessel was covered with dirty, blackish, breaking-down granulations. In order to get to healthy bone and dura, it was necessary to remove the overlying sinus groove from the knee to a point as near the jugular bulb as possible. It was necessary to make another incision up toward the parietal region and remove some of that structure. On palpation, the sinus did not occasion any particular uneasiness—it gave no pulsation. The compression experiment was tried, but it was not continued, as the Doctor did not consider the manipulation attending the procedure altogether safe in the presence of a clot. In view of the fact that the temperature was 99°, and at this time there were no symptoms of thrombosis, it was decided to put the patient to bed. Several hours later, the temperature rose to 100 $\frac{1}{4}$ °, and remained thereabouts until the following day. On that day, he had a blush upon the cheek, such as is commonly seen in pneumonia. The fundus was examined again in each eye. The left was found to be exactly the same as on the day previous. The right eye had undergone a change, and the papilla had undergone a degree of blurring which was evidently a beginning papillitis. It was then decided to open the sinus. It gave no bleeding; one blade of

the scissors was introduced into the lumen of the vessel and the external vessel wall slit down as near the bulb as possible—and this did not result in bleeding. A jugular resection was then done. The clot was next removed from the sigmoid sinus. The superior petrosal vessel was explored and opened inward to a point opposite the posterior semicircular canal, but bleeding from this source was never obtained, and its lumen was occupied by a clot which apparently was non-infected. A director was then bent and passed out toward the region of the torcular—no bleeding. A scalp incision was made out to that point, and with a gouge a furrow of bone was removed corresponding to the lateral sinus. The Jansen forceps sufficed to make a narrow canal, exposing the external wall of the vessel. This was normal in appearance. At a point midway between the knee and the torcular the clot had broken down, and yellowish-red pus exuded from the thrombus. Slight bleeding was obtained from the torcular end. It was determined to conclude the operation, but before doing so the curette was introduced into the lumen of the remaining portion of the lateral sinus, the precaution being taken to have the assistant exert pressure in the neck over the course of the opposite internal jugular, primarily, for the purpose of cutting off the aspirating influence, and, secondly, for aiding a return flow—a procedure which he had never seen practised. Optic neuritis developed on the fourth day in the left eye. The broken-down contents of the lateral sinus showed staphylococcus infection. The clot representing the extreme distal end of the thrombus was lost; the clot occupying the jugular vein was microscopically negative. The jugular vein itself was invaded beyond the limit of clot by staphylococci. The case was skin-grafted. The patient now hears a low whisper at ten feet.

Discussion.—Dr. GRUENING cited a case of jugular thrombosis in a child—a case in which the thrombus was removed from the jugular bulb. The outer bony wall of the lateral sinus was removed as far as could possibly be done without injuring the facial nerve; an incision was made into the sinus but no blood came from below; the clot was removed with a curette.

It was a case of scarlet fever. The child was taken with scarlet fever on March 9th, with a temperature of 103° , which went up and down, as is usual in scarlet fever, from the 9th until the

14th. At one time the temperature had been 104° ; on the ninth day it was 102° ; on the tenth day it suddenly rose to $104\frac{1}{4}^{\circ}$. There was some distress in the ear.

On examination of the ear, Dr. Gruening found bulging on one side and redness on the other. Paracentesis was performed on both sides. The pus removed contained staphylococci. On the following day the temperature was still 104° . Because of bulging, another paracentesis was performed. The temperature then dropped to 100° ; it rose again the next day to 104° . After this, the temperature remained normal for five days. On the fifth day there was some slight swelling of the glands over both mastoids. There was very little discharge from the left ear; there was decided tenderness over both mastoids. Double mastoiditis was diagnosticated. A number of physicians were called in to corroborate this diagnosis. They agreed upon it and advised operation. At the operation very extensive destruction was found. There was a sequestrum on both sides. When this was removed, the sinus was bare. After the operation, the child had a normal temperature and felt comparatively well. Both sinuses, however, began to be covered with granulations, and on April 1st, ten days after the operation on the mastoid, the temperature suddenly rose to 105° and a fraction. The temperature remained at 105° ; it did not go down. It did not exhibit the oscillation that one generally sees in cases of thrombosis. On April 2d, a blood culture was taken. It was negative. A consultation was held, both sinuses were inspected, and one was found to be completely covered with granulations. On the left sinus, where there had been no discharge or bulging of the drum, there was a spot of discoloration. It was concluded that the sinus wall on that side was diseased. Dr. McKernon assisted in the operation in the evening of the same day. The bulb was exposed, the incision made, and there was bleeding from above and not from below. The next day the temperature was somewhat lower, and from that on the patient made an uneventful recovery.

The difficulty in this case was to decide which side was affected. It was not necessary to ligate the jugular. He contended that it was good practice to draw out the thrombus from the jugular bulb.

Dr. PHILLIPS spoke of an experience he had been going through with a scarlet-fever patient. It was a case where there

was no great amount of pus in the mastoid cells, but many centres of infection throughout, all of which seemed about to break down. The patient was a boy about fifteen years of age. After a complete operation, the temperature continued to run at about $102-103^{\circ}$ in the afternoon, down to 100° in the morning. The physician in charge was one of our best diagnosticians, and he felt that there was no doubt that this temperature was coming from the mastoid region. Dr. Phillips could not satisfy himself that it did not, but there was no indication of further infection of any kind in connection with the wound. The dressings came out clean. There was a blood count taken every day, and three days after the operation the patient showed some 32,000 leucocytes. This alone, in the opinion of the family physician, settled the question that the temperature was due to mastoid infection. Dr. Phillips gave considerable attention to the case, and finally found in a recent work a record that in scarlet fever it was customary to have an excessive leucocytosis; but no case was recorded where the count was above 30,000. This patient gradually developed a kidney complication, which has remained during the past five weeks, but he has made an uninterrupted recovery from the mastoid wound.

Dr. BACON said that he had been fortunate enough to see the interesting case which Dr. Gruening had reported. He had not learned the outcome and was very glad to hear that it was so favorable. 1. What seemed to him of special interest in this case was the continuous high temperature. It certainly looked like pneumonia. There are often such cases in children where one is much in doubt whether to operate. In the case specified that seemed to be quite a puzzling feature. As no central pneumonia could be diagnosed certainly, it seemed to be a case of sinus thrombosis—as it proved to be. 2. The condition and appearance of the sinus wall. The sinus which contained the thrombus had a grayish and unhealthy appearance and was not covered with granulations, while the other one, on the other side, was completely covered with granulations.

Dr. RICHARDS did not believe it an advisable procedure to curette the bulb of a sigmoid sinus. He felt confident that the percentage of mortality would not justify the procedure; that is, where the sinus is thrombosed and no spontaneous return flow occurs after the external vessel wall has been freely slit open, then a jugular resection should be done. He had not seen a

sufficiently favorable outcome from cases treated in this way to warrant its practice.

Dr. BACON stated that he had had many cases of sinus thrombosis where he had curetted out the bulb, and in which recovery resulted. He did not feel that there was any danger at all in this procedure, and he could not agree with the author of the paper as to his conclusions.

Dr. GRUENING cited an extraordinary case of double thrombosis that he had seen this past winter. The case is living. On one side the clot was removed from the bulb. The temperature remained high, so he was obliged to go to the other side, where he did not get a return flow. He was compelled to tie the jugular and exsect it. The patient did not do well after that. On examining the wound it was found that the jugular had become blocked below. The wound was then extended and the jugular tied behind the sterno-clavicular articulation, and from that time there was a subsidence of temperature, with subsequent recovery. There has been no increased temperature for the past two weeks.

This was the first case of double thrombosis of the lateral sinus that Dr. Gruening had had under his care.

EXHIBITION OF NEW INSTRUMENTS.

Dr. PHILLIPS showed a little **case of ear instruments** gotten up by his assistant, Dr. Neres. On releasing a small catch, a spring is released which raises the instruments at one end. The reverse end of each instrument rests in a small socket from which it can easily be withdrawn.

Dr. GRUENING exhibited a **section of a jugular vein**, which contained streptococci, and called attention to the importance of cutting out the vessel and leaving the wound open. Streptococci were seen in all the walls of the vein. The case was one in the hospital. The patient was operated on and did well for a number of days. He then complained of distress, and it was found that he had a thrombosis on one side. The jugular was exposed and found empty. It was tied behind the sterno-clavicular articulation.

Dr. Gruening spoke of a case which he had recently seen in Mount Sinai Hospital. The patient had been operated on in some other institution for sinus thrombosis. The jugular had

been tied and the wound was closed immediately. A large abscess developed in the neck.

Dr. BACON read a paper entitled, "Report of a Fatal Case of Brain Abscess of Otitic Origin," which is printed in full on page 269, and exhibited the brain.

REPORT ON THE PROGRESS IN OTOTOLOGY DURING THE THIRD QUARTER OF THE YEAR 1903.

BY DR. ARTHUR HARTMANN.

Translated by Dr. ARNOLD KNAPP.

ANATOMY.

241. **Shambaugh.** The distribution of blood vessels in the ear labyrinth of the ear of *Sus scrofa domestica*. Nineteen pages with colored plates. *Decennial Publications of the University of Chicago*, vol. x., Chicago, 1903.

242. **Held.** Investigations on the microscopic structure of the labyrinth of the vertebrates. Part I. on Corti's organ and the other sensory apparatus of the labyrinth in the vertebrates. Leipzig, B. G. Teubner, 1902.

243. **Streit.** On the improper anomalies of the cranial sinuses, on accessory sinuses and important venous communications. *Arch. f. Ohrenheilk.*, vol. lviii., pp. 85 and 163.

244. **Frey.** Report on an unusual abnormality of the anvil. *Arch. f. Ohrenheilk.*, vol. lviii., p. 226.

245. **Streit.** On the oblique course of the facial nerve. *Arch. f. Ohrenheilk.*, vol. lviii., p. 233.

246. **Vernieuwe.** On the surgical anatomy of the mastoid process. *La presse oto-laryngologique*, vol. 1903, No. 8.

241. This excellent monograph furnishes a desirable addition to the comparative anatomy of the labyrinth, and especially of the labyrinth vessels. The author has injected about five hundred embryos and fetuses and new-born pigs, and of these there were about one hundred serviceable specimens. A watery solution of Berlin glue was used, which was injected through the umbilical artery in the fetus and embryo under constant pressure and in the carotid of the new-born. In the new-born the most favorable height of the fluid column was 80 to 100 cm, in smaller

embryos about twice the length of the cadaver. The corrosion of the celloidin corrosions took place in nitric acid for twenty-four hours. The adherent fragments were then removed with the forceps. The examinations were made with the aid of the stereoscopic microscope. Notwithstanding, it was impossible to reach a final decision in regard to the intricate vascular network of the maculæ, and no illustrations or descriptions were possible. The author was able to obtain a perfectly clear picture of the course of the arteries. Agreeing with the descriptions of the reviewer, the labyrinth artery was found not to divide into a number of branches before its entrance into the bone: it first divided into two main branches, namely, into the anterior labyrinth artery, and into a branch which divided into two branches which freely communicated with each other and with the anterior labyrinth artery. One of these branches supplied principally the lower half of the cochlea as well as the posterior part of the vestibulum; the other rises immediately, and supplies the middle and apical turn. As regards the distribution of the main trunks of the veins, the author found them in the pig not to agree entirely with the conditions found by the reviewer in man. The veins of the aqueductus vestibuli and of the porus acusticus were absent. The large veins were also missing in his specimens, which pass in the human labyrinth over the convexity of the bony wall of the ampulla. Further investigations are required at this point to show whether this difference is not caused by a different method of preparation. The large vestibular and aqueduct veins are situated principally not in the endost, firmly united by the celloidin mass, but, as has been shown by the metal corrosion specimens, in special bony channels, whose contents float freely; and if the bone has been macerated for only twenty-four hours, probably are lost in the subsequent mechanical attempts at isolation. The vascular supply of the semicircular canals in the author's specimens present an unusually well-marked capillary network, which is situated in the wall or endolymphatic channel; while in man, the vessels of the semicircular canals are situated in the endost and in Ruedinger's ligaments, and do not form a marked capillary network in the membranous canals. Arterial glomeruli of the cochlea were found absent in the pig, as well as in man.

SIEBENMANN.

242. The histology of the membranous labyrinth has in the

last decades been investigated by the most competent workers. It suffices to call attention to the great work of Retzius, and it is clear that for the investigator of to-day a very small and unpromising field remains uncultivated. Notwithstanding, this paper of HELD's is a very deserving and noticeable production. The critical analysis of the microscopic conditions resulting from the use of a mixture of bichromate of potash, formalin, and acetic acid, as well as the recognition of the pertinent literature, makes this monograph of Held's unusually valuable in a scientific sense. The investigation followed the wonderful construction of the supporting apparatus of Corti's organ, whose external delicate hair cells are thereby fixed and isolated. The supporting apparatus consists of cells whose protoplasm is characterized by a peculiar fibrous framework, and whose external form is exactly fitted to serve as a support. The Corti's columns and the Deiter's cells belong to the fibrous supporting cells. The internal phalangeal cells and terminal cells are grouped with the supporting cells. The author distinguishes three kinds of supporting cellular systems: (1) the general arch, with three subdivisions; (2) the basal floors of this arch; (3) basal special supports for the hair cells. (1) As regards the general arch, the internal-columnal cell with its head-plate forms the inner boundary. Externally, there is the fibrous system of the third Deiter cell, and in its middle part, by the lamina reticularis, the lower column of the general arch is fastened to the membrana basilaris. The general arch is, however, (2) supported and made tense by the basilar membrane. In the heads of the internal hair cells, complicated supporting fibres are not present. (3) The basilar steps of the hair cells are of importance. This very interesting, supported arrangement and cellular formation has been carefully described by the reviewer in the year 1888, in a paper on the connection of the Corti's and Deiter's cells of Corti's organ and its form. The reviewer at that time showed that the lower part of the external Corti's cell rested upon a peculiar branching cup-shaped structure, which is to be regarded as a protoplasmic excretion of Deiter's cell. Held has been able to confirm this view with his very exact microscopic investigations. As regards the connection of the internal hair cells with the last terminal fibres of the nerves, Held is of the opinion that only in the lowest segment of the hair cell a similar connection exists. The nerves pass as delicate, naked

neurites between the internal phalangeal cells and terminal cells upwards to their destination.

As regards the long-debated question of the termination of the external radiating fibres of the auditory nerves, Held has accepted the view of the reviewer, that the radiating nerve fibres pass through the open part of the branching cup-shaped structures and present at their extremity a peculiarly shaped structure, which in teased specimens represents a granular mass at the lower end of the hair cell.

Held mentions the so-called centrosomes in the cells of the cochlear duct. He finds that the hair cells of the macula and of the crista acustica are completely covered on their surfaces by a neurite protoplasm rich in neurosomes. The reviewer has a number of similar specimens which were preserved in a mixture of osmic acid. These are in general the important results which the author brings in his very careful paper. The illustrations are beautiful and most instructive.

KATZ.

243. Partly from literature, partly from extensive investigation of skulls, the normal relations and the various anomalies of the venous sinuses are described. Their relation to the temporal bone deserves otological interest. Attention is drawn to the great importance which these anomalies possess for the pathology of otitic diseases.

HAENEL.

244. On the internal surface of the head of the incus, an exostosis was found, situated like a mushroom, consisting of round, compact bone almost 1 mm in diameter. The temporal bone presented no other pathological peculiarity.

HAENEL.

245. The descending branch of the facial nerve ran in this case 0.7 cm externally from the annulus tympanicus, about $\frac{1}{2}$ cm posterior of the frontal plane drawn through the posterior periphery of the sulcus. In this specimen, the horizontal position of the membrana tympani was well marked.

HAENEL.

246. The importance which the structure of the mastoid process possesses in determining the course and the existence of suppurations in the cranial cavity is demonstrated by a number of anatomical specimens and clinical observations.

BRUEHL.

PHYSIOLOGY.

247. **Hensen.** Progress in certain parts of the physiology of hearing. From *Ergebnisse der Physiologie*. Wiesbaden, Bergmann, 1902, p. 49.

248. **Marikowszky.** On the connection between the muscular system and the labyrinth. *Pflüger's Arch.*, vol. xcvi, p. 284.

247. In the large physiological collective report of Asher and Spiro, the chapter on the "Physiology of the Ear" has been written by HENSEN, who can be regarded as the Nestor, as well as the most energetic worker, in this field. It is interesting to see that in the compilation of the material published within the last thirty years the author's own views and conclusions have been confirmed. One hundred and seven papers have been selected. These have been divided into two main chapters on the sound-conducting apparatus and on auditory perception. In the first part, the papers on the external ear are reviewed, and attention is drawn to the importance of its two-time foundation. An experiment of the author is given. The ear canal was closed with warm sealing-wax. The entire auricle was surrounded with a mass of moist clay several *cm* in thickness. The perception of ordinary voice was so little interfered with that questions did not have to be repeated. It was, however, striking that the sound of a medium-sized tuning-fork was always heard louder when the tuning-fork was held directly in front of the auditory canal. Hensen does not accept the view of Mach—that on closure of the auditory canal a tone which is conducted to the ear by bone-conduction is augmented because the escape of sound is prevented. In this, he accepts a paper of Lucae. In regard to the membrana tympani, Hensen opposes Fick's view—that the drum is a resonator consisting of radiating fibres of varying pitch. The unsymmetrical deviation and funnel shape only prevent distributing after-vibrations.

Kessel's and Lucae's experiments on the movement of the drum membrane are cited against the idea of a tuning down of parts of the membrane. The author thinks that unsymmetrical vibrations of the drum membrane and of the hammer and anvil joints can produce combination sounds, notwithstanding the calculations of Hermann.

In the review on the ossicles, the results of Bezold and Schmiedeknecht, with their own experiments, are given. However, it is added that the observations do not suffice for aural hearing,

because the experiments have been practised with too loud means.

From clinical papers, Hensen concludes that the conducting apparatus produces the hearing for small differences, and that the experiments of Lucae show that the accessory spaces of the ear serve to diminish the resonance within the tympanum.

The question whether the Eustachian tube is open or closed is, according to Hensen, still far from settled. The papers of Lucae, Hammerschlag, Ostmann, and Beckmann only are quoted.

Of the papers on the function of the inner muscles, Bockendahl is first discussed. Attention is drawn to a contradiction with his own experimental results—that in prolonged tones the contraction of the tensor must also be prolonged. This, however, is not always the case, nor is it the logical result of a theory. After a review of Pollak's experiments, Hammerschlag's investigations on the course of the tensor reflexes are carefully described. Hensen thinks that the internal muscles act, in that they serve a purpose in careful hearing when a sound is being watched for, and that thereby the drum membrane, through tension, becomes tuned down, and, notwithstanding the relaxation of the muscle, the vibration is kept up for some time longer than would correspond to the tuning down. The view of Mueller and of Ostmann, that the muscles serve as dampers and protecting arrangements, is not accepted, because dangerous noises, like explosions, are transferred without warning, and that, in general, a membrane put on the stretch would be in more danger of being harmed than a loose one. In the subject of bone-conduction, Hensen recognizes an unusually difficult subject. The physiologically possible ways of conducting sound are the windows or the aqueduct of the vestibule, though the attempts to explain the increased bone-conduction in cases of stapes ankylosis are not acceptable. Neither does he accept the path through the bone to the labyrinth capsule, as was suggested by the experiments of Mader, though he has not actually proved everything against it; his opinion rests upon calculations furnished by Deetjen.

The second chapter on auditory perception is introduced with methods for testing the hearing, and beyond the enumeration of the various well-known experiments he remarks, under the heading of Rinne's test, that the handle of the tuning-fork

should in this case only be used as a test object, because the sound of the branches and of the canal cannot be directly compared. The studies on the dying out of tuning-fork vibrations of Quix, Jacobson, Barton, Bezold, Edelmann, and Schmiegelow lead Hensen to conclude that the tuning-fork is serviceable in making a diagnosis, but that it is a mistake to go beyond this practical use.

In explaining the mode of action of the foot-plate of the stapes and the second molecular movements within the labyrinth fluid, Hensen gives his own experiments and those of Deetjen and Klein, which were performed with the aid of Klein's membrane pipe. He emphasizes also that the acoustic movements of the stapes were not localized to the cochlea, as otherwise a separating plate from the vestibule would have been found present. The experiments of Dennert and Kaiser are briefly reviewed.

The papers of Overbeck, Vierordt, and Wien on the loss in intensity of sound in propagation have led to divergent views. The view of Vierordt, that sound diminishes in arithmetical proportion, is regarded as theoretically impossible by Hensen, and depends upon a mistake in the order of experimentation; according to Wien, the sound diminished somewhat more rapidly than the extension in the spherical wave would have demanded. After describing the papers of Schaefer and Quix, Hensen speaks of an unfinished series of observations which investigate the sensitiveness of the ear for varying pitch. A diminution of the sensitiveness with the pitch is surely not present; it is more likely that an increase exists.

On the limits of hearing, the papers of Cuperus, Appun, Zwaardemaker, Schradt, Bezold, and Krebs are briefly reviewed. The curve of Zwaardemaker is considered unusually instructive, and in presbycusis the rigidity of the sound-conducting apparatus is not the etiological factor, but we must think of the possible injury to the resonators, if they come into play in distinguishing clang-tint.

It is still an open question how many vibrations are necessary to produce a sensation of tone. Auerbach, Martius, Kohlrausch, Mayer, Abraham, and Bruehl have worked on this subject but have not arrived at a final decision.

The papers of Urbantschitsch on the fatigue and extent of diminution of sound are reviewed.

Personal investigations on the hearing of changes in pitch have made Hensen conclude that the large part of the basilar membrane is set in vibrating motion, and that an apparatus must exist which makes it possible to recognize the site of the maximum of vibration. Possibly, it is situated in the very pronounced number of nerves running longitudinally.

The proof that the cochlea suffices to hear noises does not exist, according to Hensen; nothing speaks for the necessity that noises are perceived by the cochlea and not by a noise organ. A number of papers are reviewed in this sense to show that the cochlea can act as a form of resonating apparatus; the clinical results of Bezold, and Urbantschitsch's examination of deaf-mutes, and of Gradenigo and Berthold in diplacusis are given. Experimental investigations in this direction are furnished by Munk, Baginsky, and Ewald. Koenig, ter Kuile, and Lindig have endeavored to show the possibility of presenting phase differences.

The question whether hearing is possible without a labyrinth, and only with a stump of the auditory nerve, is partly positively and partly negatively answered. There are experimental papers, from which we learn that we must be very careful in answering the question of hearing and of not hearing.

Under the investigations on the course and termination of the auditory nerve in the brain, Siebenmann's classification is accepted, and the papers of Baginsky, Monakow, Monk, and Larionow are reviewed.

In a concluding remark, Hensen regrets that his review had to pass over a period of thirty years, and that he had not, therefore, been able to do justice to all papers. "Unquestionably, observations and results of experiments which prove to be important beginnings of progress will surely later come to their right."

ZIMMERMANN.

248. Based on the investigations of Hoegyes, Ewald, and of the reviewer, the author studied the changes which took place in the muscular system of the body after half- and whole-sided destruction of the labyrinth, which was classed as disturbances of the equilibrium. Doves and rabbits were experimented with. This paper is to be greeted with pleasure, as a new contribution to the structure of the theory of a tonus-labyrinth. We find here, for the first time, co-ordination tables for the muscular tone emanating from the labyrinth.

According to the author, the labyrinth in the rabbit is in connection on the one side with the occipital muscles ;

The external rectus, the superior rectus, and the superior oblique of the same side ;

The internal rectus, inferior rectus, and the inferior oblique of the other side ; with the

Muscles which rotate the head laterally, of the opposite side ;

On the anterior extremity, with the abductors, extensors, and pronators of the same side ; and the

Adductors, flexors, supinators of the opposite side ; and with

The trunk muscles of the same side.

The author has not been able to describe a definite scheme for the tonus action on the posterior extremity. He agrees with Hoegyes and the reviewer that the muscles of respiration and phonation are in connection with the labyrinth, though he is not sure whether they are homonymous or crossed. According to the reviewer, an idea of tonus cannot be given in such a definite manner. Unquestionably, both halves of the body receive tonus from each labyrinth in certain muscular groups, principally crossed ; in others, principally uncrossed. This is shown by the fact that we cannot obtain a complete relaxation of a single muscle in one-sided destruction of the labyrinth. Complete relaxation, moreover, appears only after complete destruction of both labyrinths.

The author is, in a certain way, also of this opinion, for he assumes that in the dove the labyrinth is connected with the reflex inhibitory arrangements of the opposite- and the muscles of the same-sided, extremity.

Differing from my own result is the observation that, of the trunk muscles, the homonymous trunk muscles receive their tonus from the labyrinth of the same side ; while I have found them principally to receive them from the opposite side. I, however, firmly believe in my own results. DREYFUSS.

GENERAL.

a.—REPORTS AND GENERAL COMMUNICATIONS.

249. **Schmiegelow.** Communications from the oto-laryngological division of the St. Joseph's Hospital, 1902. Copenhagen, 1903.

250. **Bauerreiss.** Report of Professor Habermann's clinic for diseases of

the ear, nose, and throat in the University in Graz, from Jan. 1, 1898, to Dec. 31, 1900. *A. f. O.*, vol. lviii., p. 236.

251. **Buerkner.** Report on the service of twenty-five years in the University Ear and Nose Clinic in Goettingen, from Feb. 20, 1878, to March 31, 1903. *A. f. O.*, vol. lix., p. 20.

252. **Voss.** Report on the ear clinic of Professor Trautmann for the year from April 1, 1901, to March 31, 1902. *Charité-Annalen*, xxvii.

253. **Daae, Hans.** Investigations in the cause of diminished hearing in school children. *Norsk Magazin for Laegevidenskab.*, No. 8, 1903.

254. **Boulay.** Ear disease considered from a life-insurance standpoint. *Ann. des mal. de l'or., du lar.*, 1903, 3.

249. Two hundred patients were discharged, 6 died. Of 202 operations, 28 were radical operations on the middle ear, 19 simple mastoid operations after Schwartz, and one radical operation after Stacke. Thirty-three cases of chronic purulent otitis are reviewed. Pyæmic symptoms appeared in 2. The particulars of these cases have been published. After the radical operation, 15 cases were healed, 7 were improved, in 2 the final result was unknown, and in 2 the after-treatment was interrupted. The cause of death in the 2 fatal cases was, serous meningitis in one, and in the other, tuberculous meningitis, which developed during the course of a purulent otitis and was erroneously supposed to have started from the ear. In the 24 cases which were operated upon radically, in 12 the hearing was improved, in 1 the hearing was unchanged, in 2 it was diminished, in 9 no record was kept of the hearing.

JOERGEN MUELLER.

250. After a statistical arrangement of the material, a complete report on 12 unusually interesting cases of middle-ear suppuration with complications follows. One case of acute mastoiditis deserves mention, which ran its course with a hemiplegia of the opposite side. At autopsy an abscess was found in the thalamus opticus, presumably metastatic in origin. Of the 10 cases of sinus thrombosis, 2 died from complications present before the operation, 4 recovered after simple exposure of the diseased sinus, 3 after operation on the sinus, 1 succumbed to chronic sepsis following a metastatic colitis after operation. In no case was the jugular vein ligated.

HÄNEL.

251. This is principally a statistical study. During the twenty-five years, 30,777 patients were treated. Of these, 58.68 % were males, 40.32 % were females; the percentage of children was 46.45 %. Of the diseases, the ear was affected in 84.50 %, the nose and naso-pharynx in 15.29 %. Of the ear diseases, 26.79 %

were located in the external ear, 68.91 % in the middle ear, and 4.30 % in the internal ear.

HAENEL.

252. Two hundred and forty patients were treated in the hospital. The antrum was opened in 54; the radical operation was performed in 88. Of the cerebral complications of chronic suppurations which terminated fatally, with the exception of an abscess of the temporal lobe, there were 4 sinus thromboses and 2 abscesses of the temporal lobe. The case-histories and autopsy reports are given. An unusual case of melano-sarcoma of the auditory canal is mentioned; also, one of a tumor in the floor of the fourth ventricle in double-sided chronic purulent otitis, an injury of the labyrinth wall with a knife (in the region of the external semicircular canal and of the facial canal).

BRUEHL.

253. From 1895 to 1901 the number of deaf children in the public schools was found to show that 4 % were deaf; of the children who, on account of their extreme deafness, were not able to pursue their studies, there were 0.50 % and 0.26 %. Of these deaf, 47 were examined. Nearly all the children showed pathological changes, and in 39 % of the boys and 56 % of the girls suppurations or their sequelæ were present. In a separate class, including the feeble-minded and the extremely deaf, there were 11.2 % deaf. Forty-four were examined and only five drum membranes showed a normal appearance. In 40 % of the boys and 50 % of the girls, suppuration or its sequelæ were present. These figures apply only to those who were practically considered to be deaf. On examination with the whispering voice, the number of deaf (and hearing power less than 4m) showed 41 % in the primary schools and 90 % in the special classes. In order to remedy matters, an attempt should be made to limit the deafness and also to arrange a better system of instruction. It is important to direct attention to the auricular suppuration in scarlet fever, measles, etc. (The author recommends immediate paracentesis.) The adenoid vegetations should be removed. These were found in 56.5 % of the deaf boys, and in 75 % of the deaf girls. The deaf should be instructed in special classes, but not together with the deaf-mutes; otherwise, they are liable to forget the use of hearing.

JOERGEN MUELLER.

254. BOULAY thinks it is very necessary that life-insurance companies should lay more stress upon the careful examination

of the ears. Not only should a definite line of questions be put, but when abnormalities are present a specialist should be consulted.

ZIMMERMANN.

δ.—GENERAL PATHOLOGY AND SYMPTOMATOLOGY.

255. **Panse.** Clinical and pathological communications. III. Anatomical conditions in patients whose hearing has been tested. *A. f. O.*, vol. lix., p. 84.

256. **Grunert.** On the prognosis of bullet wounds of the ear. *A. f. O.*, vol. lix., p. 129.

257. **Frey.** On the occurrence of glycosuria in otitic disease. *A. f. O.*, vol. lviii., p. 171.

258. **Toubert and Fasquelle.** Hearing across a scar in patients who have had the vault of the skull trephined. *Arch. internat. d'otol.*, etc., lxiii., p. 845.

259. **Felix.** On the involvement of the middle ear in lupus vulgaris and leprosy of the upper respiratory passages. *Ann. des mal. de l'oreille, du lar.*, No. 3, 1903.

260. **Bonnier.** On distant paracousis. *Ann. des mal. de l'oreille, du lar.*, No. 2, 1903.

255. The description of the histological findings in thirteen temporal bones is preceded in every case by the functional examination of the hearing made during the patient's life.

In the temporal bones I. to III. there was an atrophy in the basal part of the spinal ganglia; in IV. to V. there were connective-tissue bands in both windows, a diminution in number of the basal ganglion cells; VI. to VII. presented connective-tissue occlusion of both windows, a diminution of the basal ganglia. In VIII. to IX. there was bony ankylosis of the stapes; Corti's membrane had sunk down into the internal spinal sulcus; its fibres were separated; hyaline masses replaced Corti's columns. The basal ganglion was surrounded by connective-tissue bands. The auditory nerve was degenerated. Cases X. to XIII. have been published in PANSE's previous communications. Panse finds that the most striking feature in his examination is the disproportion between the atrophy of the basal ganglion cells and the good hearing for high and very high tones. HAENEL.

256. While superficial bullet wounds of the ear usually give a better prognosis than the deep wounds, the two cases published by GRUNERT show the opposite condition:

(1) Bullet wound in the depth of the canal, anteriorly down and in. Dysphagia or marked deafness; no vertigo; after thirteen

days the revolver bullet was coughed up. Three months after the injury, the patient came for treatment on account of the suppuration. This was healed, with closure of the drum. A whisper could be heard in 50cm, so that presumably only a very light degree of labyrinthine concussion was present.

(2) Superficial wound in the vicinity of the ear, with destruction of the anterior bony canal wall; severe injury to the labyrinth, with permanent deafness and vertigo; middle-ear suppuration, membranous stenosis of the canal. At the radical operation, the incus was found dislocated into the antrum.

HAENEL.

257. In connection with a paper of Grunert's on the same subject, FREY reports on a case of cerebellar abscess which was healed by operation, in which, together with a disturbance in respiration and heart action, with rhythmic pulse, a transient but very marked glycosuria was observed. He regards this glycosuria as being dependent upon inflammatory irritation in the vicinity of the morbid focus, which extended to the centres in the floor of the fourth ventricle. This explanation appears to him to suit Grunert's case of extradural abscess with pachymeningitis, in which Grunert found the glycosuria to depend upon certain toxic conditions. In questionable cases of intracranial disease after ear lesions, Frey considers the answer to glycosuria to point to the localization of the process in the posterior cranial cavity.

HAENEL.

258. J. Larrey ("Injuries to the Skull, and their Operative Treatment," 1834) reported on four patients who were trephined on account of injury to the skull and complained after the operation of tinnitus or autophony and hyperacousis. These symptoms were relegated to the operation, and Larrey believes that persons who have been trephined hear through the trephined opening. This same standpoint is taken by Guyon (1843), as well as by H. Larrey (1867), with a further publication of three cases.

TOUBERT and FASQUELLE have observed a patient who was trephined on account of a bullet injury. After a careful examination, they conclude, with Courtade, that the presence of a bony defect in the vault of the skull does not change the hearing apparatus in its function, and that the tinnitus, as well as the hyperacousis, depends upon the fundamental lesion and not upon the operation.

OPPIKOFEK.

259. In the twenty cases of lupus which FELIX examined, generally a bilateral middle-ear catarrh was present; in one case, also an ulceration of the Eustachian tube, with suppuration; in three cases, suppuration independent of lupus. In leprosy, the nervous form was present as long as the naso-pharynx and the nose were not affected; no changes in the middle ear. The tuberculous form had, however, affected the middle ear in six cases.

ZIMMERMANN.

260. BONNIER repeats his experiment of placing the tuning-fork at a point distant from the ear, and praises it as a more rational method of performing Weber's test. The physical proof depends upon the extraordinary fiction, that from the handle of its tuning-fork two forms of waves always emanate simultaneously—one a sound-producing and the other a vibrating, and that only the first reaches the ear, while the latter soon disappears. Practically the presence of distant paracousis in a deaf person shows a peripheric disease, while its absence, a nervous disease. If this paracousis is present without other functional disturbance, then the first sign for progressive deafness is present.

ZIMMERMANN.

C.—METHODS OF EXAMINATION AND TREATMENT.

261. Ostmann. On quantitative determination of hearing with the objective hearing-scale. *A. f. O.*, vol. lix., p. 137.

262. Urbantschitsch. Vibratory massage of the Eustachian tube in chronic middle-ear catarrh. *M. f. O.*, 1903, No. 3.

263. Urbantschitsch. An apparatus for friction massage of the ear or Eustachian tube. *M. f. O.*, 1903, No. 4.

264. Goldstein. The use and abuse of the Eustachian bougie. *The Laryngoscope*, July, 1903.

265. Warneke. The treatment of the ear and nose with hot air. *Berl. klin. Wochenschr.*, 1903, No. 37.

266. Haug. Anæsthesin in the treatment of involvements of the canal, and for local anæsthesia in paracentesis. *A. f. O.*, vol. lviii., p. 267.

267. Haug. On the influence of certain subjective auricular symptoms by treating the genital zones of the nose. *M. f. O.*, 1903, No. 3.

268. Hopkins. The treatment of chronic catarrhal deafness. *Med. News*, Aug. 22, 1903, p. 354.

269. Urbano Melzi. Contributions to the treatment of external otitis media, with intratympanic injections of pilocarpin. *Arch. internat. d'otol.*, etc., 1903, p. 635.

270. Connell. A suction apparatus for continuous drainage. *Annals of Surgery*, vol. xxxvii., 1903, p. 886.

271. Chevalier. On adrenalin. *Les nouveaux remèdes*, 1903, No. 12.

272. **DUEL.** The possibilities and limitation of the electrolytic bougie in the treatment of chronic catarrhal otitis. *The Laryngoscope*, July, 1903.

273. **ROOSA.** On the use of the Eustachian catheter. *Post-Graduate*, N. Y., July, 1903.

261. **OSTMANN** describes the method of measuring the hearing with his objective scale. His new tables of amplitudes apply only for the latest Edelman's tuning-forks. An examiner who is deaf must, naturally, in order to determine the difference-time between the patient's hearing and that of a normal hearing, regard his own deafness. If one places the hearing acuity of the one to be examined and of normal hearing inversely proportionately to the square of the relative degree of amplitudes, and if one reckons normal amplitude as 1, we get for the hearing acuity a definite value, which can be easily determined from Ostmann's tables. The acuity for the various forks C, G, c, g, c', etc., can then be arranged in the form of a curve.

HAENEL.

262. After the introduction of a very thin celluloid bougie up to the tubal isthmus, external massage is practised for four minutes with a pad set in motion by a motor. The pad is applied in the vicinity of the ear, and a rapidity of the motor is desirable in which the bougie shows the greatest vibratory movements. The author thinks that this form of massage acts like a tonic on the tubal muscles and on the tensor-tympani, increases the circulation in the tube and in the middle ear, and finally acts reflexly through the branches of the fifth nerve in the tube on the auditory nerve. In a number of cases where other methods had been applied without avail, this procedure gave a favorable result—especially in reducing the subjective noises.

PIFFL.

263. **URBANTSCHITSCH** has had constructed an apparatus which, with the aid of two electric magnets on a rod, conveys various movements which can be employed in practising massage of the tube and of the mucous membrane of the naso-pharynx.

PIFFL.

264. Our author states that the bougie was a favorite of pioneer otologists, and was first used by Saissy in 1860. Its construction has varied from catgut to the perfected gold electrolytic instrument, such as is used by Duel, Phillips, and others. At the present day, bougies of whalebone or gold are chiefly used.

The bougie is very useful in diagnosis. It should be regularly employed in every case of otitis media chronica.

The author prefers the whalebone bougies, and uses them in five sizes, from $\frac{1}{2}$ mm to $1\frac{1}{2}$ mm, and has the bougies marked, in order to show what position the olive tip occupies in relation to the beak of the catheter. The chief precaution to be observed is never to use force.

The Eustachian bougies is of established value in all chronic affections of the middle ear, not only where there is decided obstruction of the tube, but also where the lumen of the tubal canal has a diameter diminished to less than $1\frac{1}{2}$ mm. The introduction of the bougie should be repeated every two or three days.

The author has found the bougie of value in occasional cases of chronic suppurative otitis media, with narrowing of the tube. He believes that a mild galvanic current, with its stimulating effect, enhances the value of the bougie, but is not sanguine as to its electrolytic results.

When the electric bougie is used with sufficient current to pass a tight stricture, it produces an erosion which is followed by reaction, and a further narrowing of the tubal lumen may result.

W. S. BRYANT.

265. The treatment with hot air is specially to be recommended for the after-treatment after the radical operation on the middle ear, then for a conservative treatment of chronic suppurations, especially when located in the attic, and also for empyemata of the antrum of Highmore. The apparatus is constructed by Pfau, in Berlin.

MUELLER.

266. In furuncles of the auditory canal, anæsthesin after 2-10 minutes produces a diminution of the pain for two hours, without influencing the course of the disease. In acute and chronic eczema, in nervous, diabetic, or arthritic pruritus, the remedy has relieved the itching. The action on the drum is not removed, the consecutive discoloration of the drum membrane and the presence of anæsthesin crystals render this remedy not suited for paracentesis. In acute exudative middle-ear processes that are getting better, a solution of thymol-anæsthesin-glycerine has acted well as an analgesic.

HAENEL.

267. HAUG describes four case-histories of female patients, in which the subjective noises and the ear pain without objective changes in the ear were always connected with the menses, and

presented characteristic changes in the genital zone of the nose, as has been described by Fliess. PIFFL.

268. The author recognizes treatment with warm vapors, ozone, and iodine-cataphoresis. Applications of very hot air to the exterior auditory canal—250 to 400 degrees. The temperature used in the Eustachian tube should not be so high. He mentions many other forms of treatment. W. S. BRYANT.

269. On learning of the excellent results accomplished by Fischenich (*Berliner klin. Wochenschrift*, 1900), MELZI injected in three cases of oto-sclerosis a two-per-cent. solution of pilocarpin into the middle ear. In one case, after about eight injections, a decided diminution of hearing set in; in the other two, deafness and tinnitus remained to the same degree after fifty injections. OPPIKOFEK.

270. The principle on which the action of the apparatus depends is the power which a falling column of water in a narrow tube has of forcing air ahead of it and sucking air after it.

The author uses a $\frac{1}{4}$ -inch tube and constructs a convenient apparatus capable of exerting sufficient suction to drain any cavity, and susceptible of regulating both the amount of the negative pressure and the rapidity of action. The apparatus is a cheap and simplified adaptation of a device by Dr. Francis Markoe. W. S. BRYANT.

271. From experiments on animals, the author agrees with other investigators that adrenalin increases the blood pressure only for a short time; as the peripheric vessels are only transiently constricted, application of adrenalin is useless when a permanent vascular constriction is desired.

272. The electrolysis of the Eustachian tube is but one of the many methods of treating chronic catarrhal otitis, but one pre-eminent for its power to restore patency of the tube. To achieve the best results electrolysis should be used sparingly, and always in connection with other forms of treatment.

The technique of the operation requires careful, patient manipulation, and the accidents which have been reported may be attributed either to the use of too much force and the neglect of caution, or to some cause independent of this method of treatment.

After electrolysis tympanic inflation should be withheld for a day or two, and if a further treatment is necessary an interval

of two weeks should be allowed to elapse before its repetition. Often one application has been sufficient. Repeated bougieing sometimes has been required. Many of the treated tubes have remained open for years; others, for a shorter time.

The precautions to be observed are to avoid using it too often, too hurriedly, or too strong. Small bougies, small current strength, considerable time, and an immense amount of patience are the precepts to follow. BRYANT.

273. Cocaine in the nares is often objectionable. To lessen the pain in passing the Eustachian catheter a rubber catheter is preferred to a silver one. Also the beak should be shorter than those usually found in the shops. BRYANT.

d.—DEAFMUTISM.

274. **Alexander and Kreidl.** Statistical examination of deaf-mutes. I. Deafmutism, hereditary influence, and consanguineous marriages. *A. f. O.*, vol. lix., p. 43.

275. **Mayet.** Consanguineous marriages and the statistics. *Jahrb. der int. Vereinigung f. vgl. Rechtswissenschaft*, vols. vi. and viii.

276. **Wishard.** Deafmutism. *Indiana Med. Jour.*, Aug., 1903.

277. **Reinfelder.** Hearing exercises in the deaf. *Blätter für Taubstummen Bildung*, xvi., No. 20.

278. **Heimann.** The blind and the deaf-mutes in Prussia. *Deutsche med. Wochenschr.*, No. 33, 1903.

274. The following investigations were based upon answers obtained from the various deaf-mute institutes of Austria. There were 558 cases, and the conclusions are as follows: The parents were related in 3.76%; deafmutism, loss of hearing, or insanity of the parents in 2.3%; deafmutism, deafness, or insanity in the relatives of the parents in 13.3%; a combination of the various factors in the parents and their relatives in 1.8%. The relationship of the parents is of no importance as a differential diagnosis between congenital and acquired deafmutism. This also holds good for deafmutism, deafness, or insanity of nearer relations; also a combination of these various factors. Deafmutism, deafness, or insanity of the parents, as well as the simultaneous affection in the father's or the mother's family, speaks for congenital deafness. The presence of a number of deaf-mute brothers and sisters also points to congenital deafmutism, and with greater probability as the number of deaf-mute brothers and sisters increases. HAENEL.

275. In Prussia, during a period of twenty-five years (1875-99), of 5,922,439 marriages, 38,310 were consanguineous. Of 1000 marriages, 6.47 % were between relatives, and of these 5.87 % were brothers and sisters ; 0.49 % uncles and nieces ; 0.11 % nephews and nieces. With a minimum number of 6.5 % consanguineous marriages in Prussia, it can be taken for granted that 365,950 offspring are living. In the statistics of the insane asylums and institutions for idiots, imbecility and weak-mindedness are considered less of a hereditary factor than the simple mental disturbance occurring in the paralytic and combined with epilepsy. In weak-mindedness, the occurrence of the disease is influenced by the consanguinity, while in three other forms of mental disease consanguinity appears to be an advantage for those consanguineous without hereditary taint. In hereditary taint, the offspring of consanguineous marriages are much more liable to these three forms of mental disease than the children of other marriages. In idiocy, imbecility, in which consanguinity of the parents plays a great rôle, the children of the uncle and niece are more affected than those of cousins. The conditions in deafmutism and retinitis pigmentosa are similar to those in weak-mindedness ; heredity plays a slight, consanguinity a great, rôle. Investigations should be undertaken to determine whether there is not an advantage in consanguinity of parents for the mental development. This would certainly be a result which would be gratefully received by many consanguineously married persons.

BRUEHL.

276. The investigations were carried on in the Indiana Institution for the Education of the Deaf. 317 pupils examined: 183 male ; 134 female ; average age a little above twelve years. Of these, 119 born deaf, 37 % ; brain fever, 36 ; cerebro-spinal meningitis, 34 ; catarrhal, 20 ; otitis media, 16 ; scarlet fever, 15 ; bronchitis, 15 ; influenza, 9 ; measles, 8 ; typhoid, 7 ; malarial fever, 6 ; scrofula, 4 ; whooping-cough, 3 ; mumps, 3 ; diphtheria, 2 ; fever, 2 ; quinine, 2 ; earache, 1 ; inanition, 1 ; paralysis, 1 ; spasm, 1 ; tonsillitis, 1 ; eczema, 1 ; unknown, 9.

The institution from 1844 to 1900—fifty-six years—admitted 2227 deaf-mutes ; 754 of the number were congenital, about 34 %.

Age at which deafness was recognized : congenital, *i. e.*, 754 under one year ; 215 between one and two years ; 289 between two and three years ; 107 between three and four years ; 128

between four and five years ; 97 between five and ten years ; 227 between ten and nineteen years ; 58 unknown.

He states that of 317 children examined 32 had hypertrophied tonsils ; 33 had foul catarrh ; 20 % of the acquired deafness came from the nose, and that it might have been prevented.

He states that the deaf and blind have their sense of smell highly developed, by necessity. W. S. BRYANT.

277. This is a report of the teacher on the instruction of seven deaf patients through the ear. They had been selected by Hartmann. They knew no words, and did not care to speak. In addition to the diminution of the hearing there was a mental lack of development. Hearing examinations before the exercises one year later with the voice are compared in tables. Before the exercises, all the scholars heard vowels—no consonants and no words. In the exercises through the ear alone there was no improvement ; with the aid of the eyes, the scholars were able to acquire simple syllable speech, and were mentally much improved ; with the aid of the conversation tube, instruction through the ear in some of the deaf was more successful than when combined with the eyes, and the hearing of these deaf improved so that they were able to understand loud speech at a distance of six metres. All children who are able to perceive vowels and consonants through the hearing tube belong in a special institute for deaf ; others who do not perceive through the hearing tube are to be instructed in deaf-mute institutes. The speech of some children instructed with the hearing tube is equal to that of those with normal hearing. BRUEHL.

278. In this paper, the fact is of interest, that while the number of blind has not decreased since the year 1871, that of the deaf-mutes is very much increased, though the increase corresponds approximately to the increase in the population.

NOLTENIUS.

EXTERNAL EAR.

279. **Ostmann.** Deformities of the external ear among the public-school children. *A. f. O.*, vol. lviii., p. 168.

280. **Sugar.** Rudimentary misshapen auricle, with atresia of the canal, congenital auricular fistula and facial hemiatrophy, probably from congenital hypoplasia of the paralyzed nerve. *A. f. O.*, vol. lviii., p. 216.

281. **Juergens.** Three cases of congenital atresia of the external auditory canal. *La presse oto-laryngologique Belge*, 1903, No. 7.

282. **Alexander.** On the pathological anatomy of keloid of the auricle. *A. f. O.*, vol. lviii., p. 195.

283. **Fleischel.** Arterial angioma of the ear. *Wiener med. Wochenschr.*, No. 35, 1903.

284. **Braislin.** Teratoma of the ear. *Brooklyn Medical Journal*, July, 1903.

285. **Konietzko.** A case of chondroma in the bony part of the external auditory canal. *A. f. O.*, vol. lix., p. 7.

279. In 7537 school children there were 54 deformities of the external ear, viz.: auricular appendages, 12; Wildermuth's ear, 27; Darwin's pointed ear, 9; "Satyrohr," 1; cat's ear, 5; in 32 the deformities were bilateral. This was especially noted in cases of Wildermuth's and Darwin's ears. Certain districts seemed to be particularly affected. Frequently, the relatives of the children presented malformations of the external ear.

HAENEL.

280. The case is interesting on account of the combination of the various deformities. The hearing spoke for an abnormal labyrinth. The author warns against operations with the purpose of restoring the canal and improving the hearing, as in the various autopsies which have been made very deep-seated changes had been found both in the external and in the middle ear. For cosmetic purposes he recommends a wax model of the auricle as made by Henning in Vienna.

HAENEL.

281. **JUERGENS** reports on three cases of microtia with closure of the external canal, in which an exact examination of hearing had been made. In the first, there was complete deafness for all forks, both by air and by bone. In the second, Weber was lateralized to the normal ear; loud voice was heard by the misshapen ear with difficulty when the normal ear was carefully closed; the lower tone limit was h, the upper f[♯]. The third was a child three months old, where the tuning-forks were distinctly perceived by bone-conduction, although the deformity was bilateral.

BRANDT.

282. **ALEXANDER** has examined two keloids of the auricle microscopically, and agrees with the views of Thorn that the keloid arises from sudden hypertrophy and hyperplasia of the normal corium. There is no proof for the correctness of Warren's theory which regards the process as a proliferation of the media and adventitia of the blood-vessels. Alexander does not

regard the carrying of ear-rings to be the cause, as much as the formation of the puncture canal for the ear-ring and the consecutive inflammatory reactions in the neighborhood, added to an individual predisposition.

HAENEL.

283. After a survey of the literature, according to which thirty per cent. of these angiomas are found about the ear, the author relates the case-history of a patient thirty-six years of age:

Since birth, a blood-tumor, of telangiectatic origin, as large as the head of a pin, existed on the right auricle near the helix, which had within the last two years distinctly enlarged; occasional hemorrhages for five years. The auricle was increased to three times its normal size, was red, and pulsed. On compression, the auricle shrank to one-half its former size, and a distinct bruit could be heard. The enlargement involved the helix and the antihelix. The lobule of the ear was free; the length was 10 cm, breadth 6 cm, thickness 3 cm.

FLEISCHEL ligated the posterior auricular artery close to its origin from the carotid; also the anterior auricular artery and a number of smaller vessels, after cutting around the auricle. The auricle was cauterized in fifteen places with the Paquelin; this latter step is to be practised after the ligation of the blood-vessels. Complete healing, with good cosmetic effect.

WANNER.

284. Patient, a woman of fifty, complaining of very severe tinnitus, keeping her awake. Ear history two years. No pain, but itching. Latterly almost absolute deafness. Meatus occluded; watch not heard on contact. Examination showed external canal tightly blocked by a tumor. Small probe could not be passed. Tumor appeared to be attached from above. It was covered with skin, and looked like a sebaceous cyst, a dilated vein crossing its outer extremity. It was too dense to be a cyst. Exploratory puncture caused brisk bleeding, indicating diagnosis of angioma. Operation.

Incision behind auricle; ear drawn forward; tumor found attached by pedicle to periosteum of bony canal, which it tightly filled. The tumor was encapsulated. Restoration of hearing followed its removal. It was composed of cartilage and myxomatous tissue, with abortive glandular elements.

The diagnosis of endothelioma was made by some from the microscopic specimens as well as the diagnosis of teratoma.

W. S. BRYANT.

285. The cylindrical tumor, about 4mm long, $1\frac{1}{2}$ mm thick, was situated on the anterior bony wall of the canal, in a boy fourteen years of age. The origin, according to the author, can be referred to a metaplasia of the periosteum, which had been an obstinate inflammatory process in the tympanum.

HAENEL.

MIDDLE EAR.

a.—ACUTE OTITIS MEDIA.

286. **Schmiegelow.** On the diagnosis and treatment of acute middle-ear suppuration. *Ugeskrift for Læger*, Nos. 33 and 34, 1903.

287. **Godokesen.** Some remarks on Professor Schmiegelow's paper: The diagnosis and treatment of acute middle-ear suppuration. *Ugeskrift for Læger*, No. 36, 1903.

288. **Haag.** On the operative treatment of acute purulent otitis media. *Korrespondenzblatt für Schweizer Ärzte*, 1903, No. 18.

289. **Botschkowski.** A case of favorable influence exerted by erysipelas on the course of a purulent otitis. *Wratschebnaja Gaseta*, No. 38, 1903.

290. **Biehl.** Sharply circumscribed inflammatory foci in the temporal bone. *Münchener med. Wochenschr.*, 1903, No. 34.

286. The diagnosis of acute purulent otitis media is first discussed on the basis of 110 cases. Of these, 61 were cured without complications; in 31, complications set in (the cases, however, healed); in 2, with diabetes, the termination was fatal; in 5, a dry perforation persisted; in 6 cases the suppuration became chronic, and in 5 the subsequent course was unknown.

SCHMIEGELOW recommends that paracentesis be done as soon as the diagnosis of purulent otitis is confirmed. He cites 71 cases where paracentesis was performed, and gives the average length of the disease:

11 days, when performed between the first and third days (13 cases)	
15 " " " " " " third and sixth days (31 cases)	
21 " " " " " " seventh and tenth days (16 cases)	
2 months, when " after " tenth day (11 cases)	

A paracentesis performed at the right moment is the best guard against complications. After paracentesis, a wick of iodoform gauze, moistened in a 2 % carbolic solution, is inserted; a dressing with sterile gauze and a bandage is applied. This is changed every day. Irrigations and cleansing manœuvres are not permitted.

MOELLER.

287. **GODOKESSEN** believes that paracentesis should not be done too early, and that if there are no beginning complications the treatment may be expectant. He recommends absolute rest in bed. The bandage does not act well if there is a great deal of discharge; it acts like a poultice, and easily leads to maceration. The best treatment is closure of the canal with a plug of sterile cotton which is frequently changed. At the beginning, the instillations of cocaine, and the ice-bag, are of service.

MOELLER.

288. Associated involvement of the mastoid cells in acute otitis media usually heals with conservative treatment; when an operation has to take place, an empyema is present, though empyemas may heal without operation, as in seven of the eight cases reported by the author. In the treatment of acute mastoiditis, paracentesis of the non-perforated portion is most important—though this operation should only be performed in the extreme cases. In the operation for empyema of the mastoid the antrum is only exposed when necessary; in most cases it is not necessary, and should not be done with a view to future hearing,

BRUEHL.

289. A patient with acute otitis media presented inflammatory symptoms in the mastoid process, which disappeared with the onset of an attack of erysipelas. As the beginning mastoiditis frequently gets well without operation; the reasoning that the erysipelas exerted a favorable influence is not correct.

SACHER.

290. Four cases of the not unusual form of acute middle-ear disease, with involvement of the mastoid process, in which the tympanum is but little affected. The bacteria found present were the *diplococcus pneumoniae* and the *staphylococcus*. The author's suggestion to fill the bony cavity with Mosetig's bone filling and suture primarily, will probably not have many imitators.

SCHEIBE.

b.—CHRONIC PURULENT OTITIS.

291. **Panse.** Clinical and pathological communications. II. Bone disease of the labyrinth, with six illustrations, after drawings by the author. *A. f. O.*, vol. lviii., p. 184.

292. **Imhofer.** A case of spontaneous dislocation of the incus, with a fistulous perforation into the bony auditory canal. *Prager med. Wochenschr.*, 1903, No. 36.

293. **Boeke.** Opening of the left mastoid process; removal of a large cholesteatoma. *A. f. O.*, vol. lviii., p. 228.

294. **De Stella.** A case of vestibular vertigo in a patient suffering from chronic otorrhœa. *Archiv. internat. d'otol.*, 1903, p. 905.

295. **Culbertson.** Case of removal of cochlea and semicircular canals. *Annals of Otology, Rhinology, and Laryngology*, June, 1903.

296. **Schiffers.** Clinical facts concerning bone complications in chronic purulent otitis. *La presse oto-laryngologique*, vol. 1903, part 7.

297. **Hoelscher.** Primary transplantation of a cutaneous flap after the radical operation. *Med. Korr.-Blatt d. württ. ärztl. Landesvereins*, 1903, No. 35.

298. **Schiffers.** Bone complications in chronic purulent otitis. *Annales de la société méd-chirurg. de Liège*, 1903, p. 503.

299. **Politzer.** A method for early closure of the wound cavity after operations on the mastoid. *Wiener med. Wochenschr.*, No. 30, 1903.

300. **Neufeld.** On the diagnosis of auricle tuberculosis. *A. f. O.*, vol. lix., p. 1.

301. **Potts.** The indications for operative interference in middle-ear suppuration. *American Journal of the Medical Sciences*, July, 1903.

302. **Leonard.** Tuberculosis of the middle ear, with report of a case. *Medical News*, July, 1903.

303. **Eemann.** The boric-acid dressing without packing, after the radical operation. *La presse oto-laryngologique*, vol. 1903, part 7.

291. **CASE 1.**—Hemorrhagic inflammation of the labyrinth with cholesteatoma. Softening of the surrounding bone. Perforation through the annular ligament of the stapes through the horizontal semicircular canal. Meningitis propagated along the auditory nerve.

CASE 2.—Cholesteatoma, extensive destruction of the labyrinth capsule, destruction of the membranous parts of the cochlea, progressive degeneration of the auditory nerve; the nerve replaced by granulation tissue, though centrally the nerve fibres could still be recognized.

CASE 3.—In acute left-sided middle-ear suppuration, formation of the sequestrum containing fistula and the semicircular canals. After recovery, on turning the patient on the rotating chair in the direction of the sound ear, no vertigo resulted; but the patient became dizzy when turned in the opposite direction. This the author regards as proof that a lymph current passing from a narrow space to the ampulla is capable of producing a sensation of movement.

CASE 4.—Chronic purulent otitis. Recovery after removal of a large sequestrum consisting of the cochlea. On rotating in either direction no vertigo.

HAENEL.

292. Chronic otitis in a child two and a half years of age, with facial paralysis; later, mastoid affection, which improved; finally, exfoliation of the incus and a sequestrum through the posterior canal wall. The author believes that the acute symptoms of the mastoid process were caused by the dislocated incus acting as a foreign body. PIFFL.

293. The microscopic examination of the pus and of the disintegrated cholesteatoma—among other bacteria a number of bacilli were found which the author regarded as tubercle bacilli. He thinks that the formation of the cholesteatoma can be explained by the presence of these bacilli. HAENEL.

294. A patient twenty-five years of age with right-sided chronic purulent otitis suffered from continuous pain in the right temple and marked vertigo. Romberg's symptom was present. The region of the oval window was carious. On cleansing the ear, the cotton carrier dislocated a sequestrum into the vestibulum, producing intense vertigo, nystagmus, vomiting, twitching in the upper and lower extremities. The sequestrum was removed at the radical operation. The horizontal canal was found intact. Complete recovery.

In the after treatment of the radical cases, the author warns against too tight packing, as this leads to excessive formation of granulations. He employs exclusively boric acid. The average time of healing is forty days. OPPIKOFER.

295. The author used the electric current to locate position of the facial nerve during operation. BRYANT.

296. Three interesting cases of ear disease are described: a girl of sixteen with excessive anæmia was cured by operation of an extensive sclerosis of the mastoid.

A laborer twenty-two years of age obtained better hearing power on removing caries in the attic and antrum.

A young woman of eighteen suffered from caries of the attic and antrum in the right ear, and chronic suppuration in the left. The former was operated on, and healed; the other was improved by proper treatment. BRANDT.

297. A case of fœtid chronic otorrhœa with total defect of the drum was operated on radically and the bones everywhere found sclerosed. Primary transplantation of a very large Thiersch graft, carefully packing with iodoform gauze. First change of dressing after six days. Healing in one month. MUELLER.

298. Three cases of chronic middle-ear suppuration with facial paralysis and deafness. The paper is meant for the general practitioner, and shows what unfortunate terminations an auricle suppuration may have when the patient and the family physician have paid no attention to the lesion.

OPPIKOFER.

299. In order to bring about an early closure of the wound cavity, if the cavity is lined with healthy granulations it is filled out with fluid sterilized paraffin. After this mass becomes hard the edges of the wound are sutured. In all cases the hearing process was normal. This procedure is especially suited for those cases in which the antrum is not opened, as otherwise the hardened paraffin may invade the tympanum. The method is practised as soon as the wound cavity shows no purulent discharge. Under very favorable conditions, when the thorough eradication of all disease has been accomplished, the introduction of paraffin can be practised immediately after the operation.

Though the average healing period is not eight to ten weeks, as POLITZER says, but generally four to five, a shortening of the healing to about three weeks may perhaps stimulate others to adopt this new method. The number of observations, however, are much too few.

WANNER.

300. Acid-fast bacilli have been found in the cerumen, which show a great similarity with the smegma bacillus in their location, as well as in the variability of their shape. The bacilli, as well as the epithelium, can occur in otorrhœa, and can themselves be mistaken for the tubercle bacilli. These pseudo tubercle bacilli are usually found isolated. In a case of cholesteatoma they were, however, very numerous. The experiments of Gottstein and Bienstock are recalled, in which the bacilli in a fat-containing medium were not at first acid-fast bacilli. He therefore recommends a very careful removal of all ointments before obtaining the material for examination. To distinguish the false from the true tubercle bacilli, the methods of von Honsell, Bunge, and Trautenrot are to be recommended, which depend upon the lessened resistance of the pseudo tubercle bacilli against alcohol.

HAENEL.

301. The symptoms indicating operation are as follows: Profuse and long-continued discharge suggests antrum or mastoid involvement. Fluctuating swelling over the mastoid or œdema behind the auricle is more apt to be due to furuncle. Tender-

ness over the mastoid, especially in the region of the antrum, is of great significance. A tender, bulging, posterior canal wall is the most important sign of all, and its non-relief from treatment is a sure indication for operation. A sinus, whatever its location, leading into the mastoid is a positive indication. Facial palsy is not important. Epileptiform attacks unusual, but may indicate cerebral pressure. Marked and rapid failure of health more often found in adults. Temperature more apt to be elevated in children. Rapid fluctuations of temperature through a range of several degrees is the most important sign in cases of pyæmia. The slow and thready pulse out of proportion to the elevation of temperature, irregularity and sluggishness of pupils, rapid failure of health, rigors or convulsions, are signs of intercranial pressure. Tenderness and œdema over the occiput are very apt to be present where the sinus is thrombosed. A bacterial examination is not always positive but important.

BRYANT.

302. Female, twenty years of age. American parentage. Family history of tuberculosis. Attack of influenza in the spring,—"treated for malaria." A discharge from the ear appeared on the pillow in September, slightly offensive; no premonitory symptoms. Two weeks later, an oblong perforation in the postero-superior quadrant. Membrane pale and edges of perforation averted. Tympanic mucous membrane thick and soft. No pain or tenderness. Eustachian tube patulous. Slight adenoids in pharyngeal vault; no history of rheumatic pains. Chest normal. Progressive deterioration of hearing and hammering tinnitus developed.

Discharge from the ear lessened under ordinary local treatment. The other ear began to discharge painlessly during sleep in December. Two perforations were found a few hours later in the lower half of the drum. Tubercular bacilli found in the discharge from both ears. In March of the next year a cough developed and the lungs were found affected.

The author calls attention to the usual occurrence of a multiplicity of perforations, absence of pain, slight degree of fœtor of discharge. Patency of Eustachian tube.

Tuberculous infection of the ear may come from primary infection of adenoids. He suggests the routine microscopic examination of all discharges from the ear.

BRYANT.

303. The author reports upon the after-treatment with boric

acid. He fills the entire wound cavity with boric-acid powder, the quantity of which is diminished with the decrease in the discharge, until finally only the places which are not covered with epidermis are dusted with the powder. The dressing is very much simpler. The manipulations are painless and the length of after-treatment is shortened. BRANDT.

C.—CEREBRAL COMPLICATIONS.

304. **Kissel.** A case of otogenous abscess of the temporal lobe of the brain of a child four years of age. *Djetskaja Medicina*, No. 2, 1903.

305. **Zaalberg.** A case of inflammation of the middle-ear cavities, ending in fatal meningitis, which was produced by an extradural abscess not recognized during life. *M. f. O.*, No. 5, 1903.

306. **Hertle.** On external pachymeningitis. *Wiener klin. Wochenschrift*, No. 32, 1903.

307. **Schulze.** Aural suppuration and cerebral tuberculosis. *A. f. O.*, vol. lix., p. 99.

308. **Haike.** Cerebral tuberculosis in the floor of the fourth ventricle and in the posterior cerebellar crus in chronic purulent otitis. *A. f. O.*, vol. lviii., p. 206.

309. **Zaufal.** Contribution to the ligation of the central end of the internal jugular vein after resecting the clavicle in otitic septic thrombosis of the sinus and of the jugular. *Prager med. Wochenschr.*, 1903, No. 37.

310. **Grunert.** On the limits of operative possibilities for otitic sinus thrombosis. *A. f. O.*, vol. lix., p. 70.

311. **Alexander.** On the pathology of internal pachymeningitis in cases of otitic pyæmia. *M. f. O.*, 1903, No. 3.

312. **Labarre.** Contribution to the study of intracranial complications of the ear. *La presse oto-laryngologique Belge*, 1903, part 7.

313. **Courtade.** A case of phlebitis of the lateral sinus of aural origin, with abnormal vascularization of the auricle. *Arch. internat. d'otologie*, etc., 1903, p. 943.

314. **Geschelin.** On otitic pyæmia. *Chirurgija*, vol. xiii., No. 76.

315. **Gosewer.** Should the internal jugular vein be ligated in otitic pyæmia? *Chirurgija*, vol. xiii., No. 76.

316. **Heine.** On the operative treatment of otitic sinus thrombosis. *Arch. f. klin. Chir.*, vol. lxx., 3.

317. **Stenger.** The otitic cerebral sinus thrombosis. *Habilit.-Schrift*, Königsberg, 1903.

318. **Hoelscher.** Three cases of extradural and persinuous abscesses cured by operation. *Med. Kor.-Blatt d. württ.-ärztl. Landesvereins*, 1903, No. 31.

319. **Wertogradow.** On the symptoms and treatment of sinus thrombosis. *Wojenno-Medisinski Shurnal*, July and August, 1903.

320. **Breyre.** Phlebitis of the lateral sinus, ligation of the jugular vein. Death. Autopsy. *Annales de la société méd.-chir de Liège*, No. 7, 1903.

321. **Randal.** Septic sinus thrombosis due to ear infection. *Medicine*, Detroit, July, 1903.

322. **Kayser.** Acute otitis media, mastoiditis, thrombosis of the sinus and jugular vein. Operation. Recovery. *Hygieia*, No. 10, 1903.

304. The sickness developed rapidly with violent symptoms, and was regarded as an acute infectious encephalitis.

The autopsy showed a bilateral otitis media, an abscess in the right temporal lobe, and the beginning of a purulent leptomenigitis.

SACHER.

305. The extradural abscess was situated on both sides of the crista pyramidalis and extended into the middle and posterior cranial fossæ,—in the latter towards the internal foramen acusticum.

PIFFL.

306. In a patient, aged thirty-six, a shallow, soft, circumscribed protrusion of the skull appeared over the left ear. Paralysis of the facial, hypoglossus, and of the extremities of the opposite side. Very severe headache; left-sided optic neuritis.

After more than a year, the skull was trephined and a large amount of pus evacuated. The dura was covered with grayish-red granulations in which many tubercle nodules as large as the head of a pin were visible. The bone was thoroughly healthy, and there was no connection with an aural affection.

WANNER.

307. After a brief report of the nine cases which have previously been published, the author reports on two cases of aural suppuration and cerebral tuberculosis which were observed in the Halle clinic during the past year:

(1) A boy, sixteen years of age, with a hereditary tubercular history and bilateral fetid middle-ear suppuration, was recommended to the clinic on account of a probable brain abscess. There was right-sided facial paralysis, paresis of the right arm, weakness in the legs, and a disturbed psychological condition. During the period of observation, it was found necessary to do a radical operation on the right side, an operation on the sinus with jugular ligation, and a radical operation on the left (tuberculous caries). A profuse hemorrhage from the sinus occurred in the last operation, which was the beginning of a fatal miliary tuberculosis. The autopsy showed a conglomerate tubercle in the pulvinar of the left thalamus opticus, which was evidently of old date but had probably developed more rapidly after an injury to

the skull received before admission to the hospital. During life the probable diagnosis of cerebral tuberculosis was made.

(2) A child eight years of age was operated on because of caries. There were headache, vomiting, change of psychic condition, choked disc, retarded pulse, and symptoms pointing to an intracranial complication. The result of the lumbar puncture showed an absence of purulent meningitis. A presumable abscess of the temporal lobe was trephined for. This was not found, and suddenly cerebro-spinal fluid burst from the cranial wound after rupture of the ectatic lateral ventricle. Purulent meningitis and death. The intracranial changes were found at autopsy to consist of old cerebral tuberculosis. A fresh miliary tuberculosis existed in the other organs which were affected secondarily to the lungs. The differential diagnosis between brain abscess and brain tumor—that is, brain tubercle—is carefully gone over.

A typically developed choked disc speaks for brain tumor. The absence of this points with considerable certainty to a brain abscess. Frequent remissions in the course of the disease, sudden change in the symptoms, a combination of the symptoms which cannot be referred to one focus, the existence of cerebellar symptoms with an intact labyrinth, all suggest brain tubercle, if the patient is young and with a distinct family history of tuberculosis or with other tuberculous manifestations. HAENEL.

308. Copious report of a case: During life, the diagnosis wavered between brain abscess and a serous meningitis. Lumbar puncture evacuated no fluid, from closure of the spinal canal through an excessively distended ventricle into the subarachnoid spaces. Opening of the temporal lobe was without result. On the last day opisthotonos pointed to localization in the cerebrum. Puncture of the cerebrum was also negative. At autopsy the diagnosis was made. The absence of choked disc was noticeable—which is usually an early and constant symptom in tumors of the cerebrum, especially in the presence of increased intracranial pressure. The author believes that the continuous and severe headache, as well as the negative result of the lumbar puncture, points to a tumor in the posterior cranial fossa. The frequent combination of otorrhœa and brain tubercle is explained as following a toxic action from the purulent middle ear, thus lowering the power of resistance of the tissues against an invasion of the tubercle bacillus. HAENEL.

309. ZAUFAL describes the case of a twenty-one-year-old student with a septic thrombosis of the sinus and jugular vein after chronic purulent otitis. In order to ligate the jugular vein in this lower part, the clavicle had to be resected. The case was healed after three months. The attempt should always be made, however, to accomplish the resection without dividing the clavicle. If, however, isolating the vein in the depth of the wound and the passage of the ligature meet with difficulty, especially if it is uncertain whether the ligature can be applied to a healthy part of the vein, then resection of the clavicle is in order, so as to allow work without danger in the depth and test the limit of the occluding thrombus towards the healthy venous channel.

PIFFL.

310. The prognosis of the sinus operation depends upon localization and extent of the thrombus, its virulence, its situation, and the numbers of the metastases, as well as on the severity and curability of the complicating intracranial changes. Two cases of thrombosis are reported where, notwithstanding an unusual extension of the thrombus, recovery took place after operation. In one case, the jugular vein was ligated at its opening in the subclavian vein; in another, the thrombus had reached the torcular Herophili and the external sinus wall was cut away. In the first case, a sublaxation of the clavicle was necessary in order to gain access to the subclavia. In cases of necessity, GRUNERT recommends that the clavicle be sawed through. These two cases are supposed to represent the limits of operative possibilities.

HAENEL.

311. ALEXANDER reports a case of pyæmia with pulmonary metastasis following sinus thrombosis in chronic purulent otitis. The incision of the sinus was followed by the escape of fœtid particles, with copious hemorrhage. The ligation of the vein was nevertheless not undertaken. One month later death followed. After a month, increase of the signs in the lungs and of the pyæmic fever. The autopsy showed multiple old and fresh pulmonary abscesses and a parietal thrombus in the neighborhood of the jugular bulb. The venous channel was free, an internal pachymeningitis was present, corresponding to the convexity of the right hemisphere with an intact arachnoid, pia, and brain surface. The disease of the dura consisted of a number of fibrinous, purulent deposits on the inner surface.

PIFFL.

312. LABARRE reports on a case of caries of the petrous bone with periphlebitic abscess, purulent exudate into the cranial cavity, and sinus thrombosis, in which an operation which had been deferred for two months on account of the non-consent of the patient, led to recovery. From this one case the author attempts to show that a preliminary ligation of the internal jugular vein in sinus thrombosis is unnecessary, if at the time of the operation no change in temperature has been observed.

BRANDT.

313. Purulent sinus thrombosis and pyæmia following right-sided chronic middle-ear suppuration in a child eleven years of age. As the general condition of the child was very bad, operation was not undertaken. Death.

As a peculiarity, five or six venous vessels are mentioned which pass on the posterior surface of the auricle in a transverse direction to its free margin. As the external jugular vein, which is the normal outlet of these veins, was not thrombosed, an anomaly in the vascular distribution is assumed, in that the blood out of the posterior auricular vein escaped exclusively through the mastoid veins into the lateral sinus.

OPPIKOFER.

314. A report of 24 cases of otitic pyæmia, of which 12 were produced by a chronic and 12 by an acute otitis. Of the cases associated with chronic otorrhœa, 8 presented pyæmia without intracranial complications. Of these, 1 recovered without metastasis and without operation; 2 without metastases were cured after opening the sinus and removing the thrombus; 4 died after operation on the sinus from numerous metastases in the muscles, joints, and lungs; 1 died after the sinus operation and ligation of the jugular; the 4 remaining patients died from abscesses in the cerebrum or cerebellum, extradural abscess, or purulent meningitis.

The enormous mortality among pyæmic patients after chronic otorrhœa (9-12) is explained by the fact that the disease had been neglected. Of the 12 pyæmic patients with acute otitis, 10 recovered; in 5 the thrombosis was found in the transverse sinus; in 4 of these the jugular vein was ligated; in the remaining 7 the sinus was not operated upon; of these, 2 died, one from meningitis and the other from degeneration of the viscera 1½ years after operation. In only 3 patients of this last series were there no metastases. In all the others, metastases—partly purulent and partly serous—were present. In 2 patients new metastases de-

veloped, notwithstanding ligation of the jugular vein. Whether in those seven cases the sinus was thrombosed in which the operation was simply opening the mastoid process can be negatively answered for only one case which died from meningitis. In this case, the contents of the sinus on puncture were normal, which was also confirmed at autopsy. SACHER.

315. The author is in favor of early ligation of the jugular vein. SACHER.

316. From 1881 to 1901, 111 cases of pyæmia were treated; 27 of these, with 2 recoveries, belonged to the time before the sinus operation. Of the 84 operated upon, 52 died, 32 recovered. As in 16 cases death was not the result of the sinus thrombosis, 68 cases remained, with 32 recoveries. Immediate exposure of the sinus is indicated when fever sets in and disease of the sinus is made probable. If the fever changes, or if rigors appear, the contents of the sinus must be determined. The sinus should be opened and its pathological contents evacuated to the region of the healthy thrombus or until hemorrhage is restored, with ligation of the jugular vein. Puncture of the sinus should be replaced by incision. Diagnostic incision of the sinus, however, should be restricted, as it is not without danger. The jugular vein is ligated in primary and secondary obturating thrombosis of the bulb, which has led to severe pyæmic symptoms and in manifest disease of the jugular vein; also, in the cases where it has been impossible to reach the central end of the thrombus, and when pyæmic fever continues; in the presence of a parietal thrombus, when a broad opening of the sinus is not sufficient. BRUEHL.

317. From a report of fifteen cases of sinus disease which were observed in the Charité hospital, STENGER describes the anatomical conditions, the causation, symptoms, diagnosis, and treatment of otitic sinus thrombosis. As sinus disease after acute suppurations must be differently regarded from that following chronic, in the first series it is often sufficient to simply remove the primary disease focus; as the thrombosis after chronic suppurations, on the other hand, shows a greater tendency to disintegrate and produce metastases, in addition to the removal of the morbid focus the ligation of the jugular vein is indicated. This ligation must precede the evacuation of the sinus. In cases of isolated thrombosis of the bulb, with metastases, the jugular vein should be ligated. BRUEHL.

318. CASE I.—Acute otitis media, paracentesis, improvement.

Several weeks later, hemicrania, transient œdema behind the ear, persistent profuse discharge. At operation a large abscess cavity occupied the entire mastoid process; exposed sinus and the dura of the middle cranial cavity. Recovery.

CASE 2.—Acute otitis media; moderate symptoms for a long time, then the patient became worse, complained of severe headache, profuse discharge, œdema, sagging of the posterior canal wall. At operation a large extradural abscess was found in the posterior cranial fossa; the sinus was transformed into a thick mass of granulations. According to the author, a thrombophlebitis of the sinus was just beginning, which recovered spontaneously, while the extradural abscess persisted.

CASE 3.—Bilateral acute purulent otitis, severe symptoms from the first. Operation on both sides about one month after beginning of the disease. Extradural abscess in the posterior fossa was found on the left side. Recovery. MUELLER.

319. A description of seven cases of otitic sinus thrombosis. The most important and reliable symptoms of this disease are the following: (1) Sudden onset of the disease in a patient suffering from otorrhœa. (2) A violent course, with rigors and intermissions. (3) Pain in a circumscribed area behind the mastoid process in the region of the emissary vein. (4) In optic neuritis the operation should be immediately undertaken. SACHER.

320. A child ten years of age has suffered from right-sided otorrhœa for six years, following an attack of measles. Headache, loss of appetite, constipation, high, irregular fever and rigors were present. A few days after exposing the mastoid the sinus was laid bare. Its outer wall was gangrenous. The internal jugular vein was changed by inflammation, and was resected down to the clavicle. Abscess of the lungs. Death.

OPPIKOFER.

321. Of late this disease has been coming more frequently into general notice. The diagnosis is extremely difficult because the complex of classical symptoms is usually wanting. The delay caused by waiting for these symptoms may be fatal, and a readiness to operate is justified in these cases.

CASE 1.—Otorrhœa, lasting for years. The previous attack lasted one week. A year ago there was threat of serious trouble. Has now been ill one week with some fever, headache, and swelling about the mastoid, apparently glandular. A chill last night. Temperature, 103.3° at 5 P.M. ; 102° at 9 P.M.

Tenderness and slight swelling behind mastoid, and tender induration on upper end of jugular. General condition typhoid. Operated an hour later. Ligated intact jugular in its lower third. Opened stony-hard mastoid, and uncovered a discolored thrombosed lateral sinus. The vessel ruptured and dark, foetid fluid escaped. Its lumen curetted back to torcular without securing flow of blood. Curetted forward into jugular bulb, whence sluggish blood flowed.

Patient discharged on thirtieth day.

CASE 2.—Child of nine, seen in October.

Chronic suppuration and polypi growths, which were removed.

Next March: Serious cranial symptoms; no nausea or convulsions. Temperature not above 102° ; frequent delirium and stupor. Chill, temperature 105.3° ; no induration of the mastoid or neck, although several cervical glands were recognized as enlarged along the great vessels. No slowing of the pulse or sub-normal temperature. Operation.

Cholesteatoma in the antrum and softened bone throughout the mastoid, which was thoroughly eviscerated, showing the inner table intact; an opening showing an apparently healthy sinus.

Temperature fell in twelve hours to $97\frac{1}{2}^{\circ}$; rose to 104° in the evening; next midnight 107.3° in axilla. No manifestations of sinus or jugular thrombosis could be found in the neck. Operation for sinus-thrombosis; jugular uncovered, and was found indurated and greatly thickened, with dark foetid pus in its scanty lumen as far as the innominate; the vein ligated, and completely dissected out. The wound of the previous operation cleansed; the lateral sinus, when opened, was found filled with greenish, broken-down clots as far as the sigmoid portion, but healthy in its lateral portion. Jugular bulb curetted from above and below. Patient suddenly collapsed. All efforts at resuscitation failed. It cannot be doubted that full uncovering of the sinus at the first operation would have revealed its dangerous condition, and might have changed the outcome. It should be an easy and harmless procedure to lay bare the sinus when the mastoid has been eviscerated, and to open the sinus and explore its contents is not very serious. Repeated partial interventions with general anæsthesia are unadvisable unless required by failure of patient's strength. Marasmic thrombosis, usually affecting the sinuses, is less prone to infection from the ear and it lacks septic malignity. In acute cases of ear trouble the jugular bulb is

the part usually involved. A clot quickly organizes, interfering with the spreading. In chronic otorrhœa the sigmoid portion of the lateral sinus is generally the part affected, and the process of phlebitis extends in both directions and is not self-limited.

W. S. BRYANT.

322. Ligation of the jugular vein before the radical operation.

MOELLER.

(To be concluded.)

ARCHIVES OF OTOLOGY.

A CASE OF THROMBOSIS OF THE JUGULAR BULB—OPERATION—RECOVERY.¹

By CARL KOLLER, M.D.

Gertie S., twenty-one years old, was admitted to the Mt. Sinai Hospital on June 30, 1902. After an attack of tonsillitis, she had suffered from pain in the left ear, general headache, and high fever with chilly sensations. Four days before admission, paracentesis of the left drum was performed in the Dispensary, without evacuating any pus.

On admission, there was some tenderness over the mastoid tip, over the posterior part of the mastoid process, and over the antrum. There was also pronounced tenderness along the upper course of the jugular vein, and wry-neck of moderate degree had developed. The drum was not thickened, but was of a pale greenish color, as if a green exudate adhered to it on the inner side, but there was no discharge. Furthermore, the fundus of each eye showed marked venous congestion, which had so much increased by the next day as to leave no doubt that papillitis was developing.

Operation July 1st.—A preliminary paracentesis was performed and was followed by considerable serous discharge. After removal of the cortex, a minute quantity of pus was found. The sinus was accidentally opened, being situated very superficially, well forward, and overlapping the antrum. It bled freely, was exposed for about an inch, and was found to be blue in color, and bulged considerably. Some granulations were found in the antrum and the posterior cells, but the cells of the tip were free of pus and granulations. The wound was dressed with iodoform gauze.

The subsequent course, after a short period of improvement,

¹ Case presented before the Section on Otology of the New York Academy of Medicine, at the meeting of December 11, 1902.

was septic in character. The patient complained of severe headache in the left side and occipital region, and of extreme pain in the upper course of the jugular vein. In addition, the papillitis increased so visibly as to deserve the name of choked disc. Blood cultures were sterile.

Operation July 11th.—(1) Curettage of sigmoid sinus. (2) Ligature and excision of the jugular vein.

The dura mater of the middle fossa was exposed over the tegmen tympani and over the antrum; it did not bulge, and appeared normal. Then the sinus was exposed in its entire length, going as near as possible toward the bulb; the sinus was thrombosed. Upon curetting, it bled freely from above, but the bleeding from the region of the bulb was not satisfactory. Then the jugular vein was ligated in the neck and was dissected out as high as possible; about $1\frac{1}{2}$ inches of it was excised; it was not thrombosed. A culture of the thrombus found in the sinus was sterile.

The temperature on the next two days ranged somewhat over 102° F. Some tenderness was still present over the wound in the neck and in the upper part of the posterior cervical triangle. On July 14th, the patient complained of severe pain in the head and of pain on swallowing. The general condition was bad; the patient became weaker and paler. When, on July 16th, the gauze packing was removed from the sinus, some pus welled out from its lower end, with a distinct pulsating movement. From now on until July 27th the temperature was almost normal; there was no pain, and the general condition was very good.

On July 27th, the temperature rose again, and from then on remained intermittent; the patient began again to complain of severe headache, but no pus came from the sinus from the direction of the bulb. Now, in the upper third of the posterior cervical triangle, a tender, diffuse swelling appeared, apparently communicating with the jugular bulb, for, on pressing upon the swelling, pus escaped from the lower part of the sinus. On August 4th, an abscess, situated between the deep muscles of the neck, near the base of the occiput, was opened and drained. With the probe one could feel a denuded area on the occipital bone. Fever and pain, however, continued. The presence of another abscess near the bulb of the jugular vein was suspected, and on August 14th this second abscess was searched for and found at a very great depth. It was reached from behind after

trying in vain to find the stump of the jugular from the old wound in the neck.

On August 16th, two days after this last operation, it was noticed that the tongue, when protruded, deviated to the left; the symptoms of hypoglossal paralysis on the left side were all present, and besides, the patient complained of difficulty in swallowing. When the sense of taste was examined, it was found impaired in the posterior third of the left side. The temperature remained high, and the discharge of pus was very profuse for a few days; it stopped suddenly about one week after the last operation. The temperature then became and remained normal, and the patient made a quick recovery. The papillitis cleared up gradually, though it took many weeks to disappear. The hypoglossal paralysis improved more slowly still, and traces of both could be recognized for several months.

This case, which presented a number of interesting features, differs in many particulars from the typical picture of thrombophlebitis of the sigmoid sinus. Its different phases explain themselves most easily, when we assume that it was one of those cases of primary phlebitis of the jugular bulb, lately brought into prominence by Leutert, Jansen, and others. When the sinus is infected in cases of chronic ear suppuration and mastoid disease, the course of the infection, by way of the antrum or the posterior cells, is quite clear; in such cases we find a perisinuous abscess, secondary phlebitis, and thrombosis of the sigmoid sinus. The mechanism of infection must be different in the acute cases, where phlebitis occurs, and mastoid disease has had no time to develop. A probable path of infection is not quite apparent as yet, but the shortest route would suggest itself as the most likely, and that would be directly from the tympanic cavity to the bulb of the jugular, which lies in such close proximity. Perhaps congenital peculiarities predispose an individual to this danger. If we look at our case in this light, the course is easily intelligible. After suffering for two weeks from an acute otitis, the patient presented unmistakable signs of thrombophlebitis: high fever with chilly sensations, sensitiveness to pressure over the course of the sigmoid sinus, but especially over the upper course of the

jugular in the neck. Papillitis rapidly developed, which does not belong to the typical symptoms of thrombosis of the sigmoid sinus, although it is regularly met with in thrombosis of the cavernous sinus. According to Jansen, papillitis is a common occurrence in the cases of primary phlebitis of the jugular bulb. The failure to find at the first operation the positive evidence of thrombosis of the sigmoid sinus or jugular vein, which had been suspected from some of the clinical symptoms of the case, goes far to prove the view of the case mentioned above. There were only slight signs of an affection of the mastoid and no perisinuous abscess; the sinus was of healthy appearance and was not occluded, although there may have been a parietal thrombus. The operation brought no relief.

At the second operation, the sigmoid sinus was found to be thrombosed in its entire length. This may have been due to the packing at the time of the first operation, but may also have been an extension upward of a thrombus in the jugular bulb. It is certain that curettage toward the bulb did not produce satisfactory bleeding, and that after the operation the symptoms continued until the first dressing, when pus escaped from the lower part of the sinus groove, thus establishing positive evidence of the existence of an abscess in the bulb. Then relief came and continued for some time, during which the lowest part of the sinus discharged freely. When this free drainage ceased, a swelling in the neck appeared below the occiput which communicated with the intravenous abscess, as was evident from the fact that, when this swelling was pressed upon, pus oozed from the lower part of the sinus groove. So the abscess in the bulb must have perforated and burrowed under the deep muscles of the neck until it appeared in the upper part of the posterior cervical triangle. Macewen, however, gives another explanation for these deep abscesses. He states that they owe their origin to phlebitis of the condyloid emissary veins. However this may be, recovery did not ensue before I had opened and drained the second abscess, which was still deeper and evidently the original periphlebitic abscess.

In conclusion, I beg to call attention to a number of unusual symptoms connected with the case: first, wry-neck is sometimes found in cases of thrombosis of the jugular vein, and the explanation given by Koerner and others is that, since the movements of the head toward the other side are painful, the head is instinctively held in the wry-neck position to avoid pain. It is hard to understand, however, why this symptom should occur only in a comparatively small number of such cases. Again, at different times in the course of our case we found for a few days difficulty in swallowing. After the last operation, the symptoms of disturbed sensation of taste and motility of the tongue made their appearance, proving a paralysis of the glosso-pharyngeal and hypoglossal nerves on the left side. It is not impossible that this may have been due to injury during the operation, although the writer feels pretty sure that such was not the case. Considering finally that the function of all the three nerves, the ninth, tenth, and eleventh, leaving the skull through the foramen lacerum in close proximity to the jugular bulb, were disturbed, and that the twelfth, leaving through the condyloid foramen, was paralyzed, it may not be too far-fetched to assume that the periphlebitic abscess was responsible for the trouble, just in the same way as we sometimes see facial paralysis in cases of otitis media.

A CASE OF PULMONARY TUBERCULOSIS,
WITH INTERSTITIAL NEURITIS OF BOTH
COCHLEAR NERVES, TOGETHER WITH
PERSISTENT EMBRYONIC ADHESIONS IN
THE SCALA TYMPANI.

BY PROF. F. SIEBENMANN, OF BÄLE.

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Translated by Dr. W. S. BRYANT, New York.

Elizabeth W., fifty-one years old, was received in the medical service of the City Hospital on May 6, 1901. For fifteen years she had suffered from catarrhal fever, and recently she had had dyspnœa and cough. For the last five weeks she experienced pain in the limbs and had lost weight. Physical examination showed a little dulness and scattered râles at both apices, with an evening temperature of 38.5° – 39° C. and regular morning remission, and greatly increased sensitiveness of the calves without other abnormality. In childhood the patient had had very good hearing, then the hearing slowly failed during the last twenty years. Tinnitus, vertigo, otalgia, and otorrhœa have never been noticed. Her father was very deaf in old age.

On July 4th the following observation was made: Both drum membranes were opaque with prominent posterior folds, no scar, and light reflex absent. Hearing: right ear, *ocm* for conversation; left ear, whisper uncertain at ear. When the ear was closed she did not understand. Functional test: a' was not perceived on the vertex. Rinne a' : A D = 0; A S = + t only by air conduction. Testing with the continuous scale gives the following results: A D heard the whistles a^2 – a^4 and the Galton whistle (Bezold-Edelmann) to 16.5 without a break, and the unweighted tuning-forks g^4 and c^4 ; A S: E₋₁ up to Galton 7, with-

out a break. The results did not vary after repeated trials. The limits of tone-perception were clearly defined.

The diagnosis is right total deafness, double nerve deafness (affection of the cochlear branches of auditory nerves?). The patient improved from Aug. 17th to Sept. 16th, when she became comatose and died on the following day without having regained consciousness.

Autopsy.—Disseminated tuberculosis of the kidneys; calcification of both apices. Œdema of the lungs, bronchitis, pleurisy, with adhesions on the right. The kidneys, the lungs, and intestines were as follows: Adrenals normal. Left kidney: capsule slightly adherent; surface covered with grayish-yellow dots, the size of a millet-seed; the ground color dirty yellow. On section, the whole cortex and the columns of Bertini were covered with similar nodules. The Malpighian pyramids were grayish-red without centres. Right kidney somewhat lobular—otherwise the same as left. Both pelves pale—otherwise normal. Lungs: Left lung adherent at the apex—otherwise free, large, and heavy; surface smooth. Calcifications the size of a pea in the apex. On section, much reddish fluid; the mediastinal lymph glands large as beans, slaty on section. Bronchial mucous membrane reddened and covered with froth. Right lung adherent everywhere. In the upper lobe there was an area the size of an apple filled with areas of calcifications—otherwise like the left lung. In the lower lobe there was a bright red granular area. The intestines were normal.

Temporal Bones.—Dissection of the petrous bones was made shortly after death, in order to get a good histological examination. Both drum membranes showed slight opacity. The right had an indistinct posterior fold. Both auditory nerves appeared normal macroscopically. The naso-pharynx and orifices of the Eustachian tubes were normal. The mucous membrane of right drum cavity was slightly thickened and pale throughout. Marked swelling of the mucous membrane in the fenestræ, the head of the stapes scarcely protruding. A drop of pus at the bottom of the drum cavity. The tube was normal. The mastoid process very pneumatic.

The Left Ear.—The mucous membrane of the middle ear was normal; no discharge on the floor. The stapes was removed from the left petrous bone, and both petrous bones immediately after the dissection were put in formalin-Mueller's fluid for a month, and then imbedded in celloidin.

Microscopic Examination of Right Ear.—Moderate swelling and round-cell infiltration of the mucous membrane of the middle ear most marked in the folds of the round window. The stapes plate slightly thicker than usual—otherwise normal. All the ossicles and joints were normal, also the wall of the labyrinth.

Labyrinth.—The trunk of the acoustico-facial nerve, stained in hematoxylin-eosin and cut lengthways, showed, on superficial examination, no quantitative or qualitative change. In the cochlear branch, groups of nerve fibres were observed, after careful examination, somewhat separated from each other in certain regions; in other places, dense and fine fibrous tissue was seen between the bundles of nerve fibres arranged in longitudinal wavy lines, which were but slightly stained and had very few nuclei. Stained after Weigert-Pal these fine fibres remain unstained. With a fuchsin-picric-acid stain they are stained light red like periosteum and the connective-tissue part of the arteries in the porus acusticus. These nerve changes of the cochlear nerve are chiefly limited to the inner third of the meatus auditorius. Towards the labyrinth they quickly decrease from the spot where the nerve divides into its branches before entering the lamina foraminulenta, and are only marked in a few of the little branches which pass to the lower part of the basal turn. The size of the normal compared to the changed area is indicated in Figs. 1 and 2. This is taken from sections Nos. 60 and 63 where the change was most pronounced, and the interspersed layers of connecting fibres were the thickest, while in the rest of the series of longitudinal sections it was less noticeable. The posterior central part of the nerve trunk is noticeable, as is seen on Fig. 2, where the facial nerve is cut at right angles and appears brownish-yellow, and is free from these red connective-tissue elements, except for the normal peri- and endo-neurium. The perineurium is normal; the

nuclei of Schwann's sheath as well as the vessels are not much increased nor otherwise changed. There is neither an increase of leucocytes nor pigmentation. In the sections stained by Weigert-Pal, the whole cochlear nerve appears lighter-colored than the vestibular or facial nerve, and even the apparently sound nerve-fibres do not have a normal color-reaction. In the modiolus, the nerve-fibres and ganglion cells are reduced from one third to one tenth their normal size. The ganglia are somewhat more affected than the nerve fibres, while there is no increase of connective tissue in the course of the nerve in the cochlea. The remaining nerve fibres seem to be qualitatively normal except that they decolorize very rapidly by the Weigert-Pal method. The ganglion cells are also very little changed. But with a higher power remarkably poorly stained ganglion cells appear singly and in groups. Instead of the nucleus with a dark nucleolus, they contain a light-colored granular central mass, not clearly outlined or differentiated, or empty spaces. Vacuoles could not be found. The degenerated cells are varicose rather than decreased. All the whorls of the cochlea are affected, apparently the least so in the upper half of the middle and upper whorls (Fig. 2). We must allow, however, that here in the normal condition the ganglia and nerves of the lamina spiralis are densest. The nerve structure of the apparently normal parts of the trunk is in some places indistinct, and in the modiolus the nerve fibres are more distinctly outlined. The scala vestibuli, with the finer structures of the ductus cochlearis, is normal, except one place in the bottom part of the cochlea, where the lamina spiralis, with the ligamentum spirale and Reissner's membrane, shows an altered development which is described below. The vestibular nerve is unchanged, both as regards its ganglia and terminations and the vestibular epithelium.

A further remarkable change occurs in the lower section of the scala tympani, as the lower half of the basilar whorl, as far as the round window, is filled up with loose areolar or embryonic tissue, containing in part bony tissue. Fig. 3 shows the relations in the neighborhood of the round window. The obliteration is here so complete that it resembles

the condition in the fourth month of gestation, when the membrane of the round window and the spiral membrane are already differentiated, but are still continuous with the loose contents of the scala tympani. The spiral ligament is defined below and inward by a fine bony plate against the contained tissue, but is adherent to it on all sides. A small space occurs immediately under the spiral membrane. Somewhat farther up—that is, somewhat nearer the upper end of the ductus cochlearis—the closure is complete; the inner wall of both scalæ juts forward and is limited by a thicker bone plate than normal towards the perivascular space of the modiolus. Osteophytic deposits occur on the lower surface of the spiral membrane, and at the bottom of the scala tympani they appear like fibrous medullated connective-tissue bone. Bone tissue also occurs in some places in the ligamentum spirale, whose lower half is here no longer distinctly defined from the “contents.” This is rich in bone corpuscles, and stains bright red with hæmatoxylin-eosin in contrast to the bluish bone of the labyrinthine capsule. It contains no interglobular spaces. The ligamentum spirale extends abnormally far, not alone downwards but upwards. It covers the upper wall of the scala vestibuli in some places as a thick layer, and passes at the inner wall directly into the connective tissue of the large perivascular lymph spaces of the vessels in the partition. Reissner’s membrane is very much thickened and deeply pigmented. The sulcus externus is flattened in some places by abnormal elevations of Claudius’s cells. The organ of Corti does not rest on a firm membrane, but directly on the confused loose fibrilli of the tympanic contents. At the border between the last and next to the last eighth of the basilar whorl—that is to say, below the position of the sulcus internus and membrana spiralis—the contents diminish, and there appears a lamina of normal connective-tissue supporting the epithelium. The free space in the scala tympani then continues to widen and the bony spicules disappear and the inferior-inner border of the spiral membrane is free, allowing it to resume its narrow form. Somewhat above the upper end of the lower third of the basilar whorl we meet normal conditions. An abnor-

mally high ligamentum spirale towards the upper wall of the scala vestibuli and an unusual breadth of the perivascular partition spaces show here, as well as at a half turn farther up, that the arrested development extends farther up than the abnormal filling of the scala tympani with connective tissue. It is remarkable that Corti's organ shows no definite change in the lower part of the cochlea and that the aqueductus cochleæ contains no connective tissue, but passes from the scala tympani back and down through the bone with a clear lumen.

The Left Ear.—Middle ear normal. In the nerve we find the same changes as in the right—that is to say, in the trunk ganglia and branches of the cochlear nerve. The total atrophy, however, appears somewhat less. The cochlear trunk is somewhat thicker, and the connective-tissue proliferation is somewhat less. This occurs, as in the right petrous bone, most marked immediately behind the spot where in the fundus meatus the cochlear trunk begins to divide into bundles for the basal whorl. Some of them are changed for the most part into connective tissue up to the point where they enter the lamina foraminulenta. Backward toward the common acoustic trunk quite a number of smaller connective-tissue bands lie scattered in the cochlear nerve. Some large isolated gaps at the central end of the acoustic trunk are filled with bright flakes (excreted myelin) and a few homogeneous amyloid bodies. These spots I have called pseudo-degenerative centres. They occur not only in the neighborhood of the section but also farther up. They are due to splitting and tearing of the single fibres, which occurs as post-mortem change and as the result of faulty manipulation in separating the acoustic nerve from the brain. In the lower half of the basilar whorl there occurs the only abnormality, very wide perivascular spaces in the anterior and posterior spiral veins and for the radiating partition vessels, and a greater elevation of the ligamentum spirale, sometimes as high as to the inner wall of the scala vestibuli. The aqueductus cochleæ is filled for the most part with areolar connective-tissue.

The changes in both ears are as follows :

1. Slight cloudiness of both drum membranes.
2. A non-perforative (terminal) middle-ear suppuration on the right.
3. Closure of the lower end of the scala tympani by bony connective-tissue and thickening of the bony foot-plate of the stapes like a monstrosity of the right ear.
4. Interstitial neuritis of both cochlear nerves.

The slight cloudiness of both drumheads is probably due to former mild middle-ear inflammations. The right middle-ear suppuration must be considered a simple localized disease in connection with the bronchitis, because there is no marked reaction and there are no changes characteristic of tuberculosis. This condition had probably not existed at the time of the examination of the ear—that is to say, two and a half months before death. Neither change can explain the extreme deafness.

The occlusion of the lower end of the scala tympani must be considered as an arrest of development and not as the result of a former inflammation in extra-uterine life, as there are no signs of destruction or change in position, which follow the perforation of the round window or the invasion of a meningitis along the aqueductus cochleæ. There is only a disturbance or an omission of the resorption of the loose connective-tissue, occurring normally in the fourth foetal month, which covers the primitive ductus cochlearis. We know that in those places where connective tissue forms dense bands there is no such resorption, but mostly a change into bone. Normally this change is observed in the modiolus and the inner part of the partition walls. Exceptionally, however, in this case the connective tissue of the lower part of the scala took part in the ossification, being apparently too thick to be absorbed. This is unquestionably not the result of an inflammation occurring after birth from the disturbances in the formation of the bony capsule of the cochlea, which appear also in the other ear, and cannot be referred to previous inflammation. These disturbances are an abnormal width of different vascular channels, a persistence of embryonic connective-tissue contents of the aqueduct, and unusually high extent of the ligamentum

spirale. The thickening of the foot-plate and the unusual height of Claudius's cells in some places can be considered as congenital abnormalities.

It would be interesting to know to what extent this congenital deformity has affected the hearing. This cannot be determined because of the many complications present in this ear. We must not rely too much on the statement of the patient that in her youth she heard well with both ears, because experience teaches us that unilateral congenital deafness, and even one-sided loss of hearing, is sometimes discovered only by chance, and only in adult life.

The most interesting change in both ears, observed and confirmed by autopsy, concerns the cochlear nerve, which on both sides presents the picture of interstitial neuritis (sclerosis). These findings in the acoustic nerve, as far as I know, have only once before been described after pathological examination, and that was by my former assistant, Dr. Sporleder.¹ The case was that of an old woman from the Home at Bâle, who became deaf in one ear after abdominal typhus, and later, after influenza, lost the hearing in the other ear. The post-mortem examination of the first ear showed extensive connective-tissue degeneration of the cochlear and vestibular branches, as well as a marked diminution of the cells of the cochlear ganglion, and of the nerve endings of the cochlear nerve. This case differs from ours in that the nerve was macroscopically atrophic, and the vestibular branch was also affected; the connective tissue was rich in nuclei, the vessels were increased, and their walls were somewhat thickened.

Interstitial neuritis is especially familiar to ophthalmologists, and we have to thank them for an explanation of the much-debated question concerning the etiology and pathogenesis of this affection. The optic nerve in its retrobulbar part and the retinal ganglion cells are typically affected with interstitial neuritis following certain poisons (alcohol, tobacco, and felix-mas). Reasoning from this, some investigators have produced the same affection in animals. By

¹ *Verhandlungen der deutschen Otolog. Gesellschaft*, Heidelberg, Jan., 1900, p. 98.

examining the different stages of the optic neuritis produced in this way, the cause of the connective-tissue proliferation in the nerve was studied. Furthermore, the question of what causal and temporal relation the connective-tissue proliferation has to the destruction of the nerve fibres and ganglion cells was decided.

Nuel¹ experimented with felix-mas in dogs. In the first stage of poisoning the nerve was doubled in thickness, rigid and œdematous; the nerve fibres were destroyed rapidly, and disintegrated. There was no infiltration of leucocytes. After the fifth day increase of nuclei in the œdematous neuroglia appeared; the intercellular spaces became smaller, and their walls thicker; at the same time the neuroglia softened and disappeared. (Nuel's epithelioid cells, which are said to occur transitionally in this process, are according to Birch-Hirschfeld only cross-sections of swollen degenerated nerve-fibres.) The walls of the vessels are thickened (endarteritis) often obliterating the lumen. The retinal ganglion cells change in the first two weeks so that after this time the nuclei will not stain with the usual reagents. Nuel thinks in interstitial neuritis the first change is in the nerve fibre and not in the connective tissue.

Similar results are reached by Birch-Hirschfeld, Holden, and Rymowitsch through experiments with alcohol. The appearances of poisoning with felix-mas and alcohol are identical, and only show differences in grade, inasmuch as the alcohol neuritis progresses more mildly. These investigators agree that extensive changes of the ganglion cells in the retina may precede those of the nerve. Birch-Hirschfeld¹ found in experimental alcohol neuritis (in opposition to Uhthoff's clinical findings) that the connective-tissue septa were not rich in nuclei, and the vessels were numerous but had no thickening of the walls. Like Uhthoff and Siegrist, he maintains that essential differences exist between simple atrophy and interstitial neuritis. An independent partial retrobulbar affection of the nerve is the cause of the acute as well as the chronic alcoholic amblyopia, and this af-

¹ "Anatomie pathologique des nevrites optiques toxiques." *Rapport de la sect. d'ophtalmologie du XIII. congrès intern. de médecine*, Paris, 1900.

² *Gräfe's Archiv für Ophthalmologie*, vol. liii., p. 79, and vol. liv., p. 68.

fection is primary in the nerve fibres. The markedly thickened network of the endoneurium does not cause the disappearance of the nerve fibres by pressure. The atrophy of the latter occurs primarily, and the connective-tissue proliferation is a secondary change, which does not precede but follows the shrinkage of the fibre, and acts only as "packing."

The clinical and anatomical separation of interstitial optic neuritis from the gray degeneration of the nerve is principally due to Uthoff,¹ who demonstrated that the connective-tissue fibres in the latter affection show another appearance, as even in more extensive proliferation the fine connective-tissue septa and consequently the structure of the nerve are preserved, and especially so, as there never is a complete obliteration of the network or disappearance of the nerve substance.

The analogy of retrobulbar alcoholic optic neuritis with the changes of the cochlear nerve in our case holds not only in the histological findings, but also in the location. For in our case the proliferation of connective tissue begins centrally from the ganglion, and is limited apparently to a short distance, but the process can be traced here and there in lessened degree back as far as the nerve is preserved in our preparation. We may therefore in this, as well as in Sporleder's case, speak of a retro-labyrinthine interstitial neuritis. Although we cannot follow the origin of this process in the acoustic nerve in the same way as has been done in the optic nerve, and we only know the final result—the sclerosis of the auditory nerve,—we may assume with considerable certainty that here the nerve fibres of the trunk together with the ganglia were first diseased. The atrophy of the peripheric part of the cochlear nerve in the lamina spiralis must be considered a secondary appearance depending on Waller's law.

After having described and explained the histological findings, we have to seek the final cause for the peculiar connective-tissue change in the nerve. Since local irritation of the acoustic nerve has not taken place, and both sides are affected,

¹ *Arch. f. Ophthalmologie*, vol. xxxii., p. 162.

our first thought is of an indirect morbid influence upon the acoustic nerves from some general disease or poisoning. These two factors are of great importance in the etiology of poliomyelitis and especially in peripheral-nerve disease, as numerous anatomical and clinical investigations of the last twenty years have shown. The infectious diseases, as well as the discrasias and cachectic conditions have gained in interest for us as otologists from the present conception of the doctrine of multiple neuritis. The importance of these two classes of diseases in reference to the etiology of the middle-ear disease has been long known. We are beginning to learn the special localization and also the manner in which the inner ear is affected through the blood supply in typhoid fever, diphtheria, mumps, measles, scarlet fever, small-pox, whooping-cough, pneumonia, erysipelas, sepsis, influenza, syphilis, tuberculosis, and malaria, and in addition in leucæmia, gout, rheumatism, diabetes, myxedema, marasmus, and cancer. We must go farther in this research before examining experimentally the local effects of the acoustic poisons, like salicyl, quinine, chenopodium oil, etc.

In our patient, from the anamnesis and general post-mortem conditions tuberculosis alone can be considered in explaining the development of the double interstitial neuritis of the cochlear nerve as it existed in our case. The centres of calcification in both apices indicate the onset of the disease at the time when she recovered from a long febrile attack in her fifteenth year, which was called "mucous fever." She did not know of any other illness. The patient dates back the beginning of her deafness at least twenty years, but it probably existed for a longer period.

We have an extensive literature on the anatomy and clinical appearances of diseases of the peripheral nerves which result from tuberculosis. Parenchymatous and interstitial changes with or without clinical appearances (latent neuritis) have been described by German and French investigators. These were, however, diseases of the nerves of the extremities, usually neuralgias and amyotrophic disturbances; also isolated cases of Landry's paralysis and paralyzes of the bladder and diaphragm, as well as peripheral

neurotabes, have been described. Affections of the cranial nerves in the phthisical have taken the form of paralysis of the vocal chords, nystagmus, and unequal pupils. Uhthoff,¹ moreover, among 221 cases of optic neuritis, found three cases which were traceable to phthisis. Involvement of the acoustic nerve in phthisis is not mentioned in the neurological monographs, not even in Remak²; recent reference books in otology contain nothing on this subject.

In our special literature there are several statements which allow the conclusion that neuritis of the acoustic nerve, of tuberculous origin, is not as rare as it might appear. The first notice I find in Frener,³ who describes a man suffering from phthisis, who was troubled toward the end of his sickness "with deafness, nearsightedness, and tinnitus." Frener found that the auditory nerve was softer than usual and that its envelope was reddened.⁴ The second note is by Erhard,⁵ who, on page 359, mentions a nervous deafness which set in acutely in a phthisical patient after hemoptysis. This observer differentiates the diseases of the nervous apparatus from those of the outer and the middle ear, by the negative appearances of the drum membrane, and by his methodical investigation of bone-conduction, like our own of to-day. Further observations appeared in the appendix to his book⁶ and under the title "*Surditas Nervosa Tuberculosa*," which I will cite on account of their importance and obscurity. He writes: "This seems to be a suitable place to cite a form of deafness which I have seen occur invariably with the same symptoms in the last stages of tuberculosis, and which in reference to prognosis can be considered a forerunner of death." Several case-histories with two post-mortem reports are given.

I. In 1857, I treated a lady who suffered from deafness, with excellent bone-conduction, due to thickening of the drum mem-

¹ *Rapport du XIII. congrès intern.*

² *Neuritis und Polyncuritis, specielle Pathol. und Ther.*, herausgegeben von Nothnagel, Band xi., Theil 3, Wien, 1900.

³ *Über nervöse Taubheit*, Würzburg, 1823, p. 31.

⁴ From K. J. Buck, *Die Krankheiten des Gehörorgans*, Heidelberg and Leipzig, 1827, pp. 125, 126.

⁵ *Rationelle Otiatrik*, 1859.

⁶ *Klinischen Otiatrik*, Berlin, 1863.

brane. She became tuberculous and feverish, and in a short time she became wholly deaf, with gradual decrease and disappearance of bone-conduction, without any special physiological phenomena, and without any anomalous secretion in the acoustic apparatus. Soon afterwards she died. II. In 1858, I treated a young lady also deaf from the same cause, with rare success, with my drum-cavity-vapor apparatus. Soon afterwards she had tuberculosis and died; complete deafness had set in with gradual loss of bone-conduction. III. In 1859, a young man consulted me for left-sided otorrhœa. The right ear was intact. His doctor wrote me in the fall that the right ear was beginning to fail without discharge, and that he was tuberculous. What should he do? I answered: "If the bone-conduction of the right side, which was formerly intact, decreases, there is nothing to be done. In my opinion crape is already on the door." Not long afterwards I received notice of his death. IV. In the winter of 1860, a young musical genius, a brother of my best friend, formerly perfectly well, contracted tuberculosis. At Christmas he first complained of decreasing hearing and diminished bone-conduction. At New Year he was dead. V.-VII. I was interested to find at the Charité if possible the pathological cause by post-mortems. In the winter semester, 1861-1862, through the kindness of Dr. Joseph Meyer, I observed three cases of tuberculosis with the same changes. Death followed in each case. I supposed at that time that the same connection existed between the retina of the auditory nerve and the marasmus of tuberculosis as exists between the retina of the optic nerve and Bright's disease, where a fatty degeneration gives a bad prognosis. So I asked a pathological expert to be careful of the acoustic nerve in the autopsy of the first subject, and we found in taking out the brain a noticeable yellow discoloration of the acoustic nerve in strong contrast with the facial nerve. In the autopsy of the second subject, the same appearances were found. In the microscopical examination of the nerve, no degeneration of the nerve fibres was found corresponding to the discoloration, so that we had to first investigate whether this yellow mottling is normal.

Farther on Erhard states that tinnitus was not noted in his cases.

Schwartz¹ mentions acute tuberculosis among febrile dis-

¹ *Lehrbuch der chirurg. Krankheiten des Ohres*, 1885.

eases, causing hemorrhagic inflammation of the labyrinth. Whether the history reported by Schwartz¹ belongs to this group cannot be determined because it is too short. This refers to a phthisical patient, forty years old, who, twenty-two years before his death, became suddenly very deaf on both sides, in whom the bone-conduction was found absent at an examination ten weeks before his death. The changes found in the middle ear and labyrinth did not account for the deafness, since there was only a slight catarrhal swelling of the mucosa of the middle ear on one side, and the other ear was normal. Habermann's observation must be quoted with caution when he found extensive hemorrhages in phthisical patients between the nerve bundles of the terminations of the acoustic nerve (modiolus, maculæ, and cristæ).

The observations of Manasse, Sporleder, and myself are of importance in reference to the clinical and anatomical comprehension of our case, because the acoustic nerve of deaf phthisical patients showed distinct microscopic degenerative changes. Manasse² described the microscopical findings in both ears in a case of phthisis, who became deaf suddenly during the disease and died of lung trouble. The middle ear on both sides and part of the acoustic-nerve ending in the labyrinth, the cochlear ganglion, and the organ of Corti were unchanged (with the exception of striking staining reaction of the ganglion cells by Weigert's method). In the microscopical sections stained by Weigert's method, a great number of light spots were seen in the trunk of the acoustic nerve which was not shrunken. In these spots the nerve fibres were replaced by fine loose connective tissue with amyloid bodies. "The anatomical condition in these centres," Manasse says, "is the same as in multiple sclerosis and tabes. We must call all these changes, centres of multiple gray degeneration of the acoustic nerve."

I leave it undecided whether we have a simple degeneration, or, in opposition to Manasse,³ an early stage of interstitial neuritis, such as was produced experimentally in the optic nerve by Nuel, Birch-Hirschfeld, and others, since both forms of nerve changes are observed in neuritis and

¹ *Arch. f. O.*, vol. i., p. 210. ² *Z. f. O.*, vol. xxxix., p. 1. ³ *L. c.*, p. 6.

polyneuritis following infectious diseases. This statement holds good also in the case observed by Sporleder and myself.¹ It concerns a seventy-one-year-old inmate of our poorhouse at Bâle, called Rüedi, who for a long time had been a little deaf and then became tuberculous, together with Ménière's symptom-complex (loud tinnitus and dizziness); he became completely deaf and died quickly of pulmonary tuberculosis. There were no macroscopic changes. Microscopically, in the acoustic trunk there could be noted partly destroyed myeline sheaths to various extent, while chiefly in the basal whorl of the cochlea there was a quantitative change in the nerve elements. The rest of the labyrinth was perfectly normal. The atrophy of the trunk described by Sporleder does not really exist, as shown by my late researches, but is only the appearance caused by tearing off a part of the cochlear nerve in its whole length, even to the lamina foraminulenta, in cutting through the acoustic nerve at autopsy.

The cases which we were able to collect out of the literature on our subject have now been exhausted. I wish to report briefly a case treated by Dr. Bider, in Bâle, which I have seen twice in consultation. Since the post-mortem is lacking, its value is about the same as Erhard's cases, although its clinical course fits our subject perfectly.

A. W., twenty years old, always in good health, normal hearing, strongly built, temperate, was first taken sick March 1, 1893, with a diffuse febrile bronchitis. One week later, deafness commenced, with moderate tinnitus. I saw him on March 14th, and he was then completely deaf for speech. Tuning-fork a' was heard neither by air- nor bone-conduction. The drum membranes were unchanged. At that time I thought that it was a case of influenzal neuritis of the acoustic nerve. A month after the beginning of the general affection, the first infiltration in the apices was shown by percussion and auscultation. The ear remained almost unchanged. The drum membrane and inflation sounds were normal. Bone-conduction for fork $a' = 0$; for fork A and a' by air $= 0$. The conversational voice (numbers) could be

¹ *Verhandlungen der otolog. Gesellschaft auf der 8. Versammlung, Jena, 1900, p. 101.*

heard close by, in 15-20cm. Soon afterwards deafness again increased and this time remained. The lung conditions grew worse, with almost continuously high evening temperature, and the patient became very thin. Then laryngeal tuberculosis appeared and on Aug. 3d—that is, five months after the beginning of the lung disease—death occurred. Meningitic symptoms, hemoptysis, and diarrhoea absent. The tinnitus did not disturb him much, and he did not complain of dizziness. Diagnosis: double neuritis of the cochlear nerve, resulting in deafness, consecutive to pulmonary tuberculosis.

At the first glance, it seems unusual not to find phthisis a cause of deafness in the statistics of the deaf and dumb, and also in the recent work of Bezold.¹ This is explained by the fact that tuberculous neuritis of the acoustic nerve is observed very rarely, and, moreover, we know that phthisis which results in deafness has a very malignant character and soon ends in death.

More than probable, at least a part of these cases, which are cited in deaf-and-dumb statistics, and are placed in the group of scrofulosis, in which granular affections, more rarely bone and skin lesions, occur, belong to the class of "deafness resulting from neuritis due to tuberculosis." These cases are about 1 % in the various statistics, a number which in the future will probably increase after attention is directed to it, and the etiological connection between tuberculosis and disease of the acoustic nerve has been positively demonstrated.

We must consider the functional results in our case and compare them with the findings of the microscopical examination of the auditory nerve. There were no symptoms of dizziness such as we observed in one patient, Rüdi, as the vestibular nerve was intact. Our observation agrees with the observations of Schwabach, Bezold, Moos, and Habermann, that in labyrinthine and acoustic-nerve affections both ends of the scale are contracted concentrically, as shown by air-conduction. It was interesting to me that in the left ear, where, besides the nerve affection, no other complication

¹ *Die Taubstummheit auf Grund ohrenärztlicher Beobachtungen*, Wiesbaden, 1902.

existed, both ends of the scale were equally affected, in contradistinction to my former observations on brain deafness, where the deeper sounds (in the commencement) were lost earlier than the higher ones. Since in the right ear, which was more deaf, the nerve was a great deal changed, we cannot draw any conclusion in regard to the functional importance of the filling found in the lower end of the tympanic scala of that ear. This is all the more to be regretted, because every change of the cochlea is associated with absence of a firm vibratory membranous foundation for Corti's organ in the lower end of the spiral plate, and there would have been a possibility of testing the validity of the theory of v. Helmholtz.

Reviewing briefly the results of our own and other investigations, we find the following results: Sometimes a polyneuritic degeneration of the acoustic nerve comes about in a hematogenous way, and appears simultaneously with extensive febrile tuberculous affections, which end perniciously. The cochlear nerve alone or the whole acoustic trunk may be affected. In these cases, we may find either a simple degeneration or an interstitial inflammatory affection; in both cases, however, the primary seat of the disease is located in the retro-labyrinthine section of the acoustic nerve, as far as we can assert from post-mortem results. Only in the rare cases, in which the patient survives the deafness for a long time, simple atrophic changes in the intra-labyrinthine section of the acoustic nerve develop in addition to this primary retro-labyrinthine disease of the trunk. The clinical symptoms of the ear consist in decrease in hearing of both sides, which in rare cases comes on by degrees, but in most cases acutely, and then leads in a short time (days or weeks) to complete deafness. Often, but not always, there exist subjective noises, and when the vestibular nerve is affected, which is not frequent, the decrease in hearing is accompanied by violent vertigo.

EXPLANATION OF THE DIAGRAMS.

Fig. 1. Interstitial neuritis of the cochlear trunk in a late stage of the disease. (Van Gieson stain.)

Fig. 1

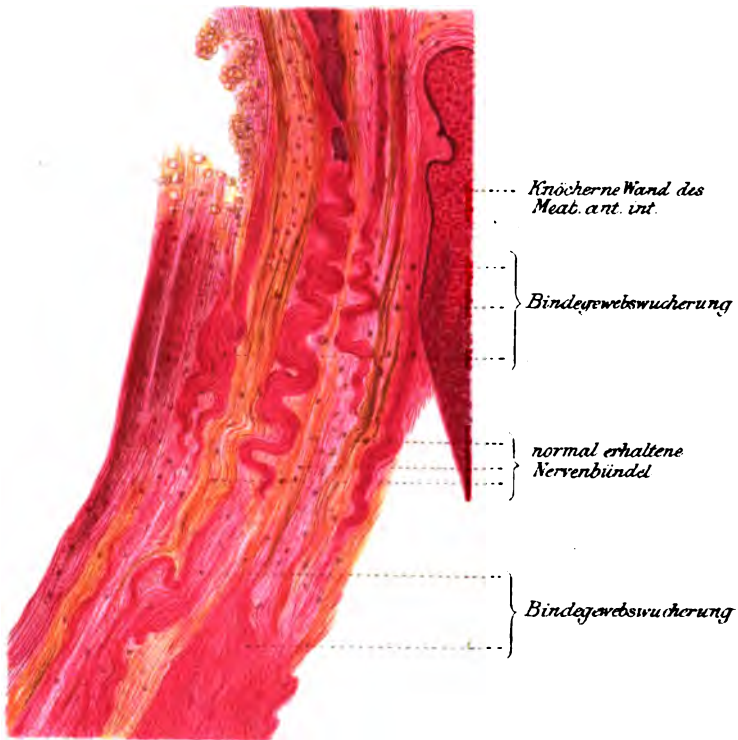
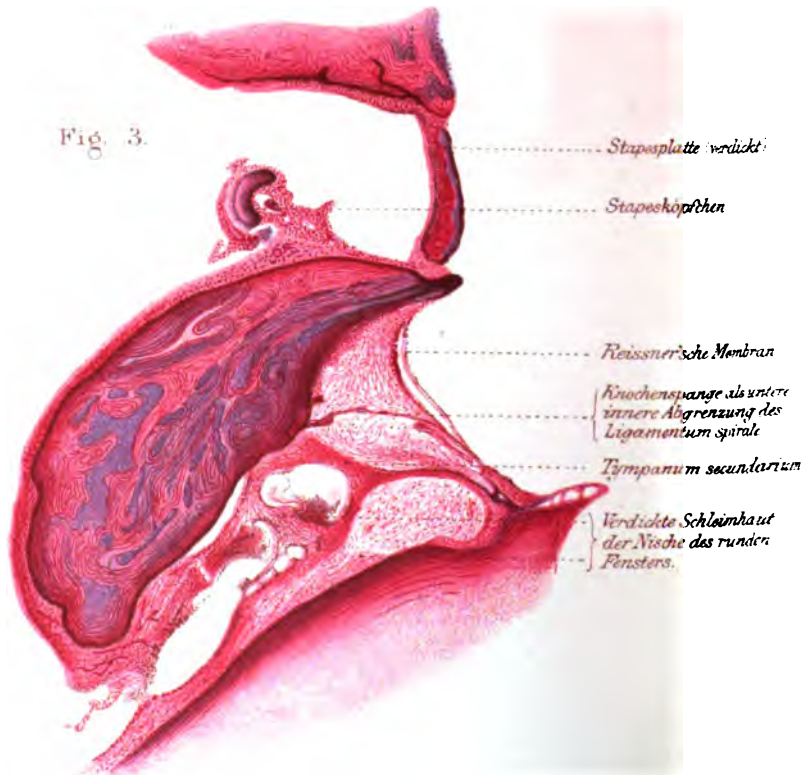


Fig. 3.



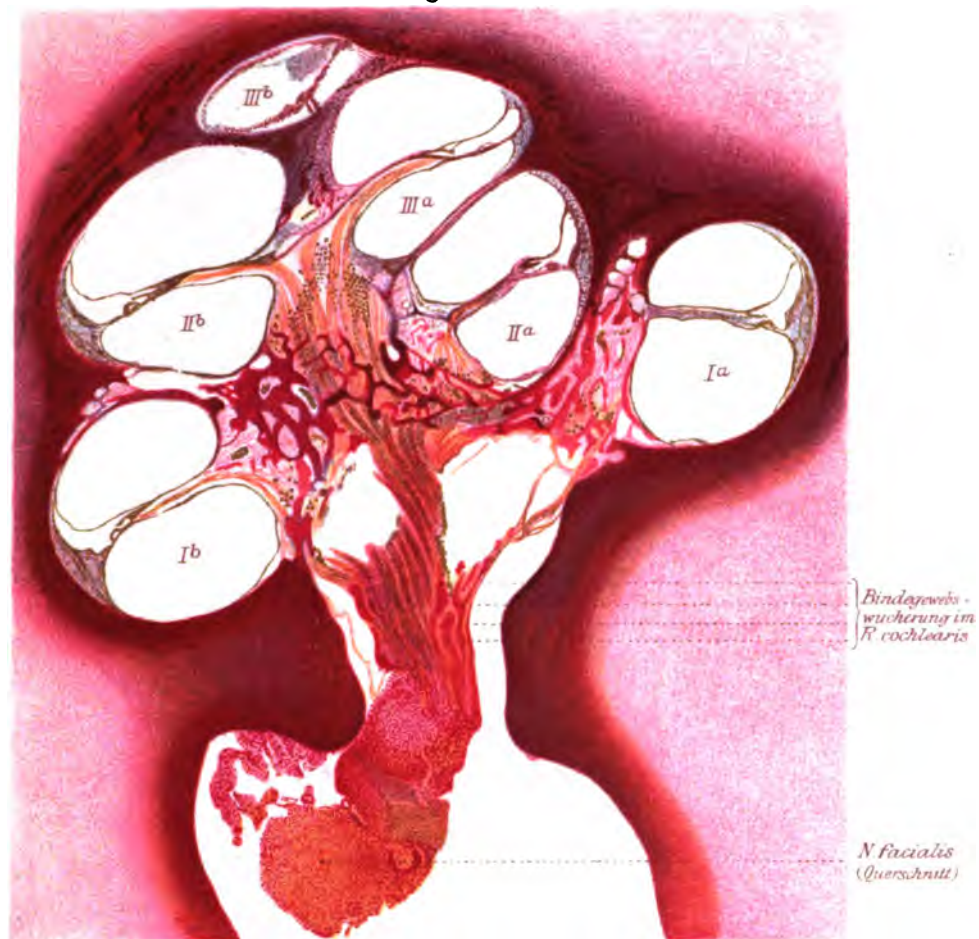


Fig. 4.



Fig. 2. Cochlear and nerve under low power in vertical axial section. Thick and delicate hypertrophic connective-tissue bands in the cochlear nerve. The ganglia and nerve terminals in the cochlea diminished. (Van Gieson.)

Fig. 3. Vertical section through both labyrinth windows. Swollen infiltrated tympanic mucous membrane in the window-niche. Lower end of scala tympani filled with connective tissue. (Hematoxylin-eosin.)

Fig. 4. Vertical section through the lower fourth of the basal whorl of the right cochlea. The tympanic scala is filled with areolar connective-tissue containing bone. The vestibule scala is constricted on the inner wall by new-formed bone plates and Reissner's membrane is somewhat thickened. (Van Gieson.)

ON THE RADICAL OPERATION FOR CHRONIC
EMPYEMA OF THE FRONTAL SINUS
ACCORDING TO KILLIAN.

BY DR. ESCHWEILER, BONN.

Translated by Dr. ARNOLD KNAPP.

THE results published thus far show that Killian's method will probably replace all other operative procedures for the cure of chronic empyema of the frontal sinus. In addition to the papers of the author and his pupil Krauss,¹ favorable reports have been published by Hegner, Peterson, Luc, and Thiele. I can add eight further cases to those previously published in the literature.

They were all severe chronic suppurations in very large cavities, so that the favorable results can be referred not so much to the benign character of the case as to the excellent method of operation, which unquestionably deserves greater recognition.

The case-histories of my patients were as follows:

CASE 1.—Male, twenty-six years of age; admitted on July 5, 1902. Has suffered from discharge from the right side of the nose for many years, and occasional pain in the right half of the head. The symptoms have become aggravated during the past three weeks. The discharge and the nasal occlusion have been more pronounced. The pain regularly set in one hour after getting up in the morning, and persisted until four o'clock in the afternoon. During the night there was no pain.

The rhinoscopic examination revealed on the right side a large polyp, arising from the infundibulum, with pus appearing

¹ Killian und Krauss, "Die Killiansche Radicaloperation," etc., *Arch. f. Laryngol.*, vol. xiii., pp. 23 and 58.

in its neighborhood. The anterior and lower walls of the right frontal sinus were tender on palpation. Transillumination was positive. After removal of the nasal polypi with a cold snare the frontal sinus was opened on July 15, 1902. The bone was rather thin, and was removed to such an extent as to admit easily a thick glass drainage tube. The probe revealed a large frontal sinus, which was filled with pus. The pus was carefully evacuated. As much of the mucous membrane as was visible appeared very much swollen and reddened, but not ulcerated. The nasofrontal duct was curetted with a sharp spoon and dilated with a Gruenwald forceps. A thick drainage tube was passed through the opening in the anterior wall of the frontal sinus, and the cutaneous wound was closed with sutures.

The after-treatment consisted in antiseptic irrigations through the drain into the nose. Pain ceased. Secretion diminished, but was not arrested. Recurring polypi had to be repeatedly removed from the right side of the nose.

At the end of August, the drainage tube had to be left out, as the canal became very narrow and the opening in the skin contracted.

The patient then remained away until September 26th, on which day, after a very severe bicycle trip, the scar became swollen and painful, and later opened, evacuating pus.

In the nose there was again purulent discharge between polypoid tissue. The radical operation was performed on November 27th.

The frontal sinus proved to be very large and presented an unusually deep orbital recess. Owing to the great depth of the orbital recess and the shallowness of the frontal sinus, it was impossible to remove the floor of the frontal sinus from above. The periosteum of the orbital roof was detached, together with the trochlea, in order to give access to the floor of the frontal sinus. The trochlea with its periosteum and the tendon of the oblique muscle were carefully separated. On detaching the periosteum, orbital fat appeared through a number of openings. The narcosis of the patient was very unpleasant, and interfered greatly with the accuracy of the operation. The anterior and lower walls of the frontal sinus were removed; the mucous membrane was curetted. A large opening was made into the nose, from which polypoid tissue was removed. A thick gauze drain was introduced from the inner angle of the bony cavity into the nose,

while a second narrower piece of packing was inserted in the temporal part of the wound. The wound was then sutured.

The subsequent course was afebrile. The gauze packing in the nose was removed after eight days. The opening in the temporal angle of the wound was kept from closing, as there was some discharge of pus. The wound subsequently closed, and the patient was discharged on October 25, 1902.

There had never been any symptoms of irritation on the part of the eye. Diplopia was not complained of. On examination, however, the patient admitted that on going downstairs the steps often appeared double. This diplopia persisted for only a few days.

In December a relapse took place. The middle of the scar bulged and on incision some pus escaped. As this fistula did not close, on January 6, 1903, the opening was enlarged and several small spicules of bone were removed from the depth. The wound then slowly closed and the patient was discharged healed in the beginning of February. He has since remained healthy. Re-examination in August of this year shows the site of operation normally healed. There are no polypi to be seen in the nose. There is slight discharge of mucus, which, however, gives him no trouble. The patient is able to pursue his vocation. He smokes and drinks beer with no bad effects. The cosmetic result is not quite satisfactory. The three-time incision has left a very distinct scar, and as these were all made above the eyebrow they are considerably more noticeable than usual. There is, however, very little deformity from the sinking of the skin of the forehead in consideration of the very large and deep cavity.

CASE 2.—Male, aged fifty-six; has suffered from discharge from the nose for many years, which would become more pronounced after taking cold, and would be associated with headache in the left frontal region. One of these attacks is at present going on. The pain is especially annoying in the morning; during the night it disturbs him very little. He complains of a very uncomfortable feeling in the head. A considerable quantity of thick purulent discharge empties into the left half of the nose.

The examination, on March 3, 1903, showed that the left side of the nose contained a great deal of yellowish purulent discharge. The anterior extremity of the middle turbinal is degenerated and thickened. About it pus fills the lumen of the middle meatus and appears to issue from the infundibulum. The right

half of the nose is normal. The left frontal-sinus region is tender, especially on palpating the lower wall at the inner and upper angle of the orbit. Transillumination is positive and shows on the left side an unusually extensive cavity.

The hypertrophied end of the middle turbinal is first removed. Two days later the frontal sinus is probed and irrigated. A large quantity of pus is evacuated without mucus and without fœtor. The irrigations are repeated every day with a cessation of the severe pain. The uncomfortable feeling in the head remains. The discharge of pus during the day did not diminish, and as after three weeks' treatment attacks of vertigo set in, the patient consented to the radical operation, which was performed on April 2, 1903.

Operation.—Morphine and ether narcosis. The left half of the nose was packed with gauze. A cutaneous incision was made along the eyebrow and carried down next to the nose. An opening in the anterior wall of the frontal sinus was made. The cavity contained a little pus and was clothed with a thick, oedematous, red mucous membrane. The cavity was very large and extended especially upwards, so that at the inner angle of the wound a vertical skin incision was made. After retraction of the skin periosteal flap, the entire anterior wall of the cavity was removed. The cavity extended very far temporally. After curetting the mucous membrane, the periosteum of the orbital roof was detached and the upper orbital wall was removed. This necessitated detachment of the trochlea. After removal of the roof of the orbit, the soft parts of the orbit did not extend into the frontal sinus.

The third step of the operation consisted in the resection of the frontal process of the superior maxilla, and in connecting this opening in the bone with the defect in the orbital roof as well as making a communication with the nasal cavities. The cells in the neighborhood of the naso-frontal duct, which were filled with oedematous mucous membrane, were carefully irrigated. So much of the nasal mucous membrane had to be removed that a flap could not be formed for plastic purposes. After removal of the nasal tampon, a glass drainage-tube was passed from the left half of the nose into the orbital part of the wound cavity. The external incision was closed with sutures.

In the subsequent course there was no rise of temperature. There was no severe pain. The sutures were removed on the

fourth day and the wound was found to be healed primarily. The drainage tube was removed the tenth day after the operation. There is practically no discharge from the nose. After removal of the mucus in the region of the anterior part of the middle meatus, the nasal part of the bone cavity can be observed through an oval fistula. Three weeks after the operation on the dorsum of the nose, a small point of pus appeared in the skin at the lower extremity of the cutaneous incision, which resembled an acne pustule. On incision, a drop of pus appeared. The probe detected no abnormality. The entire region was dressed with a moist boric-acid dressing. The small opening healed rapidly.

It seemed to me that the moist heat had a hastening influence on cicatrization in the depth, with depression of the skin of the forehead. Consequently this form of dressing was continued for two weeks.

The wound has since then been healed and all subjective symptoms disappeared. The eye was always free from irritation. There was no diplopia, though the patient was carefully examined in this regard. Cosmetically the result is very good as the scar can hardly be seen. Above the eyebrow there is a somewhat deep depression, which is distinctly to be seen, but does not deform the patient's face.

Re-examination in November, 1903, found the wound to have remained healed.

CASE 3.—Male, twenty-nine years of age; consulted me on March 25, 1903, declaring that he had suffered for one week from very severe headache, which was especially localized over the right eye. He had no complaint from his nose, though on further examination he reported that he had regularly discharged a small scab from the right side of his nose. On examination, the anterior and lower walls of the right frontal sinus were very tender. In the nose a greenish scab covers the extremity of the middle turbinal and the adjoining part of the septum. There was no pus in the infundibulum. Posterior rhinoscopy was negative.

It was impossible to pass a probe into the frontal sinus. Transillumination showed no difference between the two sides.

At first palliative treatment, with nasal irrigations and the administration of phenacetine, was tried. Later iodide of potassium was given. The symptoms persisted, and the patient, after treatment for three weeks, readily consented to a diagnostic opening of the right frontal sinus.

Operation: April 18, 1903. An incision was made as usual in line with the eyebrow, and the frontal sinus was opened at its anterior wall. The cavity was found filled with tenacious pus and very much swollen mucous membrane. As the patient had not been prepared for the radical operation, so much of the anterior wall of the frontal sinus was removed as would permit the insertion of a thick drainage tube. With the probe it was found that the nasal lachrymal duct was free. The pain disappeared after operation.

I had intended to treat the wound with irrigations, but the irrigating fluid did not run into the nose, notwithstanding the patency of the naso-frontal duct and although the patient was able to blow air into the frontal sinus with Valsalva's experiment. The drainage tube was therefore removed on May 4th, and the region of the frontal sinus was covered with a moist boric-acid dressing. The drainage opening healed in a few days.

Since the opening of the frontal sinus, from the outside, the discharge into the nose had increased without increase in the pain. The entire right side of the nose was filled daily with a thick greenish-gray crust which proved to be a cast of the entire interior of the nose. The radical operation was performed on May 22d. The cutaneous incision was like that made in Case 2. The frontal sinus was found filled with tenacious pus, and the mucous membrane was very much swollen. The interfrontal septum presented two dehiscences of about the size of the head of a pin, through which healthy bluish mucous membrane of the opposite sinus was observed. The periosteum of the roof of the orbit together with the trochlea was then detached, and the floor of the frontal sinus was opened into along the supraorbital margin. As the anterior wall of the frontal sinus was unusually thin and the chisel was not sharp enough, the inner extremity of the bridge of bone broke off. The floor of the frontal sinus was then completely removed. Thorough access to the nose was established by resecting the frontal process of the superior maxilla. No flap could be formed from the nasal mucous membrane. A thick drainage tube was inserted at the inner angle of the wound and the rest of the cutaneous incision was sutured. Healing took place by primary intention.

On the second day there was slight fever, and on the change of dressing the upper lid was found œdematous and red. Pressure in the region of the frontal sinus caused thick pus to escape at

this point. The sutures were removed and the entire cavity was dressed with a moist boric-acid dressing. The suppuration and œdema rapidly diminished.

On May 28th, the glass drainage-tube, which had been very uncomfortable to the patient, was removed. On June 4th, the wound was closed. On July 14th, rhinoscopic examination showed that the opening into the cavity had a tendency to close. It was enlarged. The production of scabs had increased, and the region of the right frontal sinus was again treated with moist dressings.

The peculiar character of the scabs led to a more exact examination. They were found to consist microscopically chiefly of mucus containing numerous epithelial cells and pus corpuscles. There was no fibrin. Bacteriologically, stained cover-glass specimens showed a large quantity of diplococci colored by Gram. Culturally, they belonged to the group of Friedlander's bacilli. There were no acid-fast bacilli.

June 17th.—A small polypus appears at the entrance to the wound cavity, which is removed with the snare. The entrance to the wound was treated every day with a 3-per-cent. solution of silver nitrate.

August 17th.—The patient after an absence of one week returns and complains of increased formation of scabs in the nose, and occasional headache which is not severe enough to prevent him from attending to his work. The skin of the flap is depressed, normally thin, and movable. In the nose, at the entrance to the frontal region, there are several scabs of the same character as previously noted. This region is treated every day with a 3-per-cent. solution of silver nitrate.

September 1st.—The patient still complains of headache. The left half of the nose is normal. The left frontal sinus is normal on transillumination. On September 12th, as the opening to the right frontal sinus appears somewhat narrow, the adjoining part of the middle turbinal is removed. This is followed by a severe bleeding which requires packing. Headache continued at rare intervals. There were occasional scabs found in the nose.

December 15th.—The cosmetic result is very good. The scar is not visible; the depression in the forehead is moderate.

CASE 4.—Male, aged thirty-seven years; has been under treatment for years on account of nasal polypi. He has complained considerably of headache, especially over the left eye. On

examination, July 18, 1903, the upper-posterior parts of the left nasal cavity are filled with polypoid masses and thick pus. The region of the frontal sinus is exquisitely tender. Transillumination is negative, both for the frontal as well as for the maxillary sinuses, while the conditions on the right side are normal. The first molar on the left side is carious. A number of polypi were removed from the nose. Irritation of the left frontal sinus did not exist.

Radical operation performed July 1, 1903. Morphine and ether narcosis according to Witzel. The incision is made exactly according to Killian's suggestion. The frontal sinus is filled with pus and œdematous granulation tissue. The trochlea is detached. The floor of the frontal sinus and the frontal process of the superior maxilla as well as the lachrymal bone and a part of the orbital plate of the ethmoid are removed to the extent of diseased cells. A glass drainage-tube is introduced into the nose. The external wound is closed with sutures. The antrum of Highmore is tapped after the extraction of the carious molar in order to irrigate subsequently. The wound healed primarily. The patient has suffered no pain and no rise of temperature. There was slight œdema of the lid. The eye was free from pain. The entire field of operation is covered with a moist dressing of boric acid.

July 27th.—The patient has suffered for the first time from pain. At the temporal end of the cutaneous incision in the eyebrow there is a fluctuating swelling. The œdema of the lid is more marked. An incision with a knife in the scar evacuates several drops of pus.

July 31st.—The swelling of the lid is less. The eye can be opened. On looking to the right and to the left, diplopia is complained of.

August 2d.—The wound is entirely healed. From the nose a broad access to the frontal sinus is visible without the presence of any discharge. Diplopia has ceased.

August 5th.—The patient is discharged. The skin of the forehead is somewhat depressed. Pus appears in the nose, coming from the antrum of Highmore. The subjective condition of the patient is very good. There is no headache; there is only slight discharge from the nose.

August 19th.—There is no pus coming from the cavity of the frontal sinus, but after carefully wiping the middle meatus, green

pus is seen coming from the maxillary opening. The opening in the alveolus is dilated and the maxillary antrum irrigated. A good deal of very foetid pus is evacuated. The patient complains of some ill-defined pain in the frontal region.

September 1st.—After repeated irrigations of Highmore's antrum there is only very little discharge. The patient is completely free from symptoms. Occasionally, on forced respiratory movements, the skin of the forehead becomes distended in the region of the operative wound. There evidently is a large communication. On looking directly downwards, disturbing double images appear. The patient is consequently forced in reading to hold the book somewhat higher than usual.

October 1st.—The patient irrigates his antrum every day. A considerable quantity of muco-pus without foetor is evacuated. There are no subjective symptoms. The diplopia on reading has passed away, though it still persists in writing.

December 17th.—There are no further subjective disturbances. There is slight discharge from the antrum of Highmore. The diplopia for writing has disappeared. The cosmetic result is good. The scar is almost invisible. The frontal depression is quite deep, though the margins are not marked, and does not deform the patient.

CASE 5.—Female, forty-one years of age; has been under treatment for a long time, on account of a chronic serous catarrh of the middle ear. The nose presents a spontaneous perforation of the septum, as large as a pea, and swollen turbinals. There is only moderate discharge from the nose. On July 7, 1903, the patient returns for treatment after an absence of a half-year. Suppuration now exists from the left ear. The *Mt* was very red and swollen. There was no perforation visible, though a moderate quantity of tenacious muco-pus was present. A pulsating pain is complained of in the ear. On the left side there is a muco-serous middle-ear catarrh associated with extreme subjective noises.

Admitted July 25, 1903. In addition to treatment of the ears, the nose was daily syringed with a solution of boric acid and with aristol insufflations. The hypertrophied extremities of the turbinals were removed. Daily examinations showed that considerable muco-pus was produced in the left nasal cavity. The region of the frontal sinus was almost insensible to pressure, though pressure at the inner and upper angle of the orbit finally

revealed some tenderness. Transillumination showed both maxillary antra transparent. Both frontal sinuses, however, were uniformly dark. Subsequently the symptoms became more pronounced, and pointed to an infection of the left frontal sinus, so that the radical operation was performed on August 5, 1903.

The frontal sinus was filled with pus and a glassy swollen mucous membrane; it was unusually small and did not extend far in a temporal direction. The frontal recess does not extend beyond 1 cm in height at the inner extremity of the eyebrow. Consequently the deformity remaining after the removal of the anterior and inferior walls was very small. Resection of the frontal process of the superior maxilla gave access to a very much diseased ethmoid labyrinth. The frontal and ethmoid cells were filled with pus granulations. The bony septa were softened and were removed with a sharp spoon. The inner wall of the orbit had to be removed quite deep. A broad communication was established into the nose and a glass drainage-tube as thick as a lead-pencil was inserted and fastened at the side of the nose. The cutaneous incision was sutured.

August 11th.—As the neighborhood of the wound showed inflammatory œdema, two sutures were removed and moist dressings applied.

August 12th.—The wound had healed. There was no pain, but diplopia was present.

August 17th.—There is some discharge from the nose. A broad opening is visible into the frontal sinus, and there is no pain. On prolonged use of the eyes, pain is experienced in the left frontal sinus. The eye itself is free from irritation. Diplopia is no longer present.

August 21st.—The patient has suffered for the last three days from headache. Rhinoscopic examination reveals nothing abnormal. The site of the operative wound is covered with a wet dressing.

August 24th.—The patient still complains of pain. Two small scabs are removed in the morning from the nose. The region of the inner angle of the eye is somewhat swollen.

September 1st.—After use of the eyes, asthenopic symptoms are complained of. Examination of the eyes revealed a certain amount of hypermetropia, for which glasses were prescribed. Though the wound appears healed, and only very little discharge is present from the nose, the patient still complains of pain and

of other symptoms, such as disturbance of menstruation, chronic constipation, associated with a neurasthenic condition.

September 20th.—The remaining part of the left middle turbinal was considerably swollen, and was removed. This was followed by some relief of the symptoms, and on November 9th the nose was almost free from pus.

November 25th.—No further symptoms from the forehead.

The cosmetic result is very good. At the dorsum of the nose the scar is slightly visible.

CASE 6.—Male, twenty-three years of age; has been an inmate of the hospital since February, 1903, on account of an inflammation of the lungs. In the course of this illness he suffered from very severe headache on the right side, and was operated on for this on March 19th. The wound in the forehead was kept open by packing until August. On the closure of the wound the severe symptoms returned, so that the patient consulted me October 10, 1903.

About 1.5cm above the right eyebrow there was a keloid scar, 3cm long, in the skin of the forehead, which was red, somewhat depressed, and tender. The roof of the orbit is only painful at the inner angle. There are severe subjective symptoms. The patient cannot bend over without suffering from severe pain in the right forehead, and is entirely unable to work. Rhinoscopically, the anterior extremity of the middle turbinal was found very much thickened, but no pus. The patient states that from time to time he was able to aspirate a collection of mucus from his nose. Transillumination shows a rather extended frontal sinus.

After admission to the hospital, on October 14, 1903, the anterior extremity of the right middle turbinal was removed, and on the 16th of that month the radical operation was performed.

After detaching the skin and the periosteum from the forehead, a cavity was encountered corresponding to the situation of the scar on the skin and containing thick creamy pus and granulations. The bony edges were removed and the walls curetted. The cavity extends very far up, though only slightly laterally. Downward and inwards it communicates by a moderately broad passage with a cavity, presumably an unusually developed frontal cell situated in the frontal process of the maxillary bone, containing thick granulation tissue. This space had evidently been overlooked at the previous operation.

As the frontal sinus did not extend far temporally, sufficient access was gained by resecting the portion of the frontal process of the superior maxilla and of the maxillary process of the frontal bone. The floor of the frontal sinus was partly formed by this latter process. Killian's bridge was preserved; the trochlea was not detached. The diseased frontal cells were then thoroughly curetted. A broad opening was made into the nose. It was impossible to form a flap from the nasal mucous membrane. A thick drainage tube was passed into the nasal part of the wound and the cutaneous incision was closed with sutures.

During the subsequent course there was no pain and no rise of temperature. The sutures were removed and the drain left off on the 20th of October. There was some retention of pus in the temporal angle of the wound, which healed after opening and dressing with moist boric acid.

On the 30th of October there was a small point of suppuration at the nasal extremity of the wound.

November 4th.—Considerable discharge from the nose. There are, however, no symptoms. On looking in all directions, diplopia is observed. The right eyeball is visibly lower than the left.

November 20th.—The slight oedema of the right upper lid persists. The patient has resumed work but is considerably annoyed by diplopia.

November 27th.—The eyes were examined and it was found that the disturbance of binocular vision did not depend upon interference of the function of the superior oblique muscle but upon an incongruent function of the muscles supplied by the third nerve. It is very probable that the inflammatory oedema has led to a slight dislocation of the entire right eyeball. Moist dressings are applied.

Two weeks later the double images have disappeared.

In the following two cases the plastic procedure according to Killian was successful. Case 8 is not entirely healed. It is, however, reported because it shows some very unusual features.

CASE 7.—Female, twenty-eight years of age, unmarried; has suffered for years from nasal polypi which have been freely removed. The long persisting headache has, however, not been influenced by the removal of the polypi, and she was led to consult me on November 8, 1903.

On examination, nasal polypi were found, together with some

pus in the region of the ethmoid. In the right side, a very large bulging ethmoidal bulla was found. Resulting from previous operations, the region of the middle turbinal presented a very unusual picture. The pain is localized to the root of the nose and the adjoining parts of the frontal and parietal regions and is present even at night. Tenderness on pressure in the frontal region is absent. Transillumination gave a clear picture.

On November 13th, polypi were removed and the ethmoidal bulla opened. No pus was found. As the pain persisted, the radical operation was performed, November 16th.

The left frontal sinus was absent. The bony funnel extending to the dura is enlarged in the direction of the internal angle of the eye. Here a small frontal cell is encountered, filled with hypertrophied mucous membrane. The region of the frontal process of the superior maxilla is exposed and the frontal and anterior ethmoid cells opened. They are all filled with diseased mucous membrane, but there is no pus. The opening in the internal orbital wall is enlarged so as to bring these cells into free communication. After all the diseased cells were curetted, I endeavored to enter into the nasal cavity, but found that this cavity was closed off by a rather thick mucous membrane belonging to the lateral wall of the nose. This wall was incised and the flaps turned outwards.

The entire cutaneous incision was sutured. The wound healed primarily; no rise of temperature; no severe pain.

November 24th.—Moist dressings have been applied. The conditions rhinoscopically are very satisfactory. In the space between the septum and the lateral wall of the nose, in front of the middle turbinal, a large opening is seen leading into the region of the cavity made at operation. There is a slight amount of discharge but no pain.

November 26th.—The patient is entirely free from pain and is very happy. The region of the inner angle of the eye is still somewhat swollen. The scar is hardly visible and not tender.

December 11th.—The patient is discharged, healed.

CASE 8.—Male, forty-four years of age; consulted me September 14, 1903, stating that after an attack of influenza in July he suffered from a very severe cold in his head. Three weeks ago very severe pain was felt in the forehead, and a specialist, whom he then consulted, removed parts of the middle turbinal on both sides. On transillumination, the left frontal sinus remains dark ;

the right, as well as the two maxillary antra, is translucent. The subjective signs are unusually severe, though the patient has relief during the night. Directly upon getting up, the pain begins and continues until the afternoon, though even after this time he is absolutely unable to perform any mental work and cannot even read a newspaper.

On examining the nose, a considerable quantity of creamy pus can be seen in front of the remnants of the middle turbinal. On attempting to pass a probe, a frontal cell was encountered and the frontal sinus could not be probed. Treatment consisted in daily irrigations of the nose and the use of Hartmann's air douche. The conditions improved under this treatment. The headache was somewhat less and not so severe and ultimately disappeared almost completely. The secretion became mucoid. On October 10th, transillumination showed that the left frontal sinus was just as bright as the right one.

On October 12th, the patient was allowed to go home with instructions to syringe out his nose daily and insufflate aristol. As long as the patient remained at home the condition was satisfactory. On returning to work, however, the symptoms gradually returned and on November 16th he again presented himself.

The rhinoscopic picture had not changed. There was some grayish muco-pus emanating from the opening of the naso-frontal duct. The region of the right middle turbinal was covered with purulent discharge. Most of the discharge passes into the throat and considerable muco-pus was found in the pharynx. On palpation, both frontal sinuses were uniformly and slightly tender. Transillumination showed both frontal sinuses to be unusually large and uniformly translucent.

Under these circumstances, I advised the patient, who had lost weight, to undergo a careful physical examination. As this examination proved negative, I decided to open the frontal sinuses for purposes of diagnosis.

This operation was performed on November 21, 1903. Incision along the left eyebrow. The hemorrhage was unusually free. After chiselling through the thin anterior wall of the frontal sinus, this cavity was found to be filled with muco-pus and thick oedematous granulation tissue. The cavity was very large and extended upwards and especially backwards. The distance from the margin in the opening of the bone to the base of the orbital process was 6cm. The radical operation was then performed and

a large flap was formed from the nasal mucous membrane. The removal of the base of the frontal sinus proved to be very difficult on account of the depth of the orbital recess. It succeeded, however, with preservation of the trochlea. On curetting the mucous membrane at the interfrontal septum through a large dehiscence, access was gained into the right frontal sinus. Before completing the toilet of the left frontal sinus, a small opening was made into the anterior wall of the right frontal sinus, and this cavity was found to be healthy. The cutaneous incision was sutured and a glass drainage-tube was inserted into the nose. Subsequently, there was at first moderate pain but no fever. The sutures and drainage tube were removed on November 24th.

On November 26th, the wound is healed. The œdema in the neighborhood is less. Rhinoscopically, a similar condition to that in Case 7 is found.

December 1st.—The discharge into the nose and pharynx has diminished. The frontal region is dressed with a moist boric-acid dressing.

December 9th.—The discharge has almost completely ceased. The patient complains of general malaise, occasional pressure in the head, but without frontal pain.

December 15th.—The patient is allowed to go home. The skin of the forehead has not sunk in. The upper eyelid is slightly œdematous. Local symptoms do not exist. In the right nose the mucous membrane has lost its swollen condition and the discharge has ceased. In the left nasal cavity there is moderate mucous discharge.

The patient is to return in four weeks.

It cannot be denied that the performance of Killian's operation requires considerable technical skill on the part of the operator. Every one will make the experience that his operating improves with the number of operations performed. The removal of the floor of the frontal sinus is sometimes very arduous, as Killian remarks, especially in the case of a frontal sinus which is not extensive in a vertical direction but very deep fronto-occipitally. This was especially pronounced in Cases 1 and 8. In these circumstances, this part of the operation is very much simplified if the detachment of the periosteum of the orbital roof is not interrupted at the trochlea, but this latter structure is removed, together with the orbital tissues, so that the roof of

the orbit corresponds to the floor of the frontal sinus. If we are careful to preserve the connection of the tendon of the oblique muscle with the periosteum, and then detach the trochlea *in toto*, the danger of permanent functional disturbance is very slight. The detached portion becomes united to the supraorbital bridge. In the first five cases, the trochlea was detached. In these, the diplopia was usually not present, or only transient, though the patients were repeatedly examined in this regard. In Case 4, however, an obscuration of distinct vision with moderate diplopia persisted for a long time after the operation, on looking downward. Though the patient was not disturbed in his vocation, nevertheless this is a warning, and I should advise the detachment of the trochlea only for those cases where the removal of the floor of the frontal sinus cannot be carried out from above.

Owing to the slight probability of the occurrence of diplopia, the radical removal of the floor of the frontal sinus appears to me to be more important than the preservation of the trochlea. If the latter is detached, it may be feasible to fix the region of the pulley to the tissues above with a deep suture. It is not surprising that diplopia occurs during the first days, and this is probably caused by transient disturbance in the function of the oblique muscle. The changes in the position of the orbital tissues, which are the result of the removal of the orbital roof and of a certain reaction on the part of the orbital tissues to the operation, can cause a temporary disturbance in binocular vision, as is shown by the fact that certain patients of Killian have also suffered from transient diplopia. In our patient, Case 6, where the trochlea was not detached, diplopia was present in all directions four weeks after the operation. This was most pronounced when the œdema of the upper eyelid was marked. The diplopia disappeared together with the swelling of the upper lid. As the ocular examination revealed a normal condition of the superior oblique muscle, the diplopia must be referred to a dislocation of the eyeball, produced by the inflammatory swelling in its neighborhood. Generally speaking, the reaction of the operation and healing of

the wound on the orbital contents is not pronounced. In not a single case was there any iritic irritation, even though before the operation no atropine had been given. It is, however, very important that the eyeball should be spared all pressure and it should not be used as a support for numerous artery clamps. I have, therefore, always immediately ligated all blood-vessels.

If the anterior wall of the frontal sinus is very thin, the formation of the bridge must be made with extremely sharp chisels, otherwise it is possible to produce a fracture of the bridge, as occurred in Case 3. This has, fortunately, just as in Killian's case No. 6, not led to any deformity. It is, however, an undesirable incident.

Certain technical difficulties are also met with in making a broad communication into the nose. After resecting the frontal process of the superior maxilla, which can be well done by cutting-forceps, the adherent spicules of bone must not be torn away for fear of injuring the lachrymal sac. The frontal and other ethmoid cells are easily exposed. These were found diseased in all eight cases. The eradication of the posterior ethmoid cells, which were found diseased in Cases 4 and 6, was not difficult. After making an opening into the nose, a very annoying bleeding occurs into the upper respiratory passages, which can often not be controlled by packing of the nose. As the patient in this stage of the operation is still deeply anæsthetized, unpleasant disturbances of respiration may set in, especially as the manipulations in the interior of the nose act reflexly upon the respiration. This is especially marked if we resect the anterior part of the middle turbinal. As it is well known that it is much easier to operate in the nose on patients who are not anæsthetized, I think it is much safer to clean out the nose thoroughly and remove the polypi and hypertrophies of the anterior extremity of the middle turbinal several days before performing the Killian operation. In the cases in which I have followed this plan, I have always been satisfied with the condition of the nose in the after-treatment. In the other cases, further operations in the nose were required.

The formation of flaps from the mucous membrane from the lateral wall of the nose, as has been described by Killian, was first successful in Case 7. This is probably due, as the experience of Thiele and others shows, to an insufficiently developed technique. In Cases 4 and 5, however, it would have been impossible for the most experienced hand to obtain material for a plastic step. In Case 4, the entire mucous membrane of the nose was in a state of high-grade polypoid degeneration, so that the ethmoid was in no place covered with normal mucous membrane. In Case 5, the ethmoid was so softened and perforated with pus that curetting led immediately into the nose. For healing, this plastic procedure is probably not absolutely essential. It is, however, unquestionably of considerable value, as it prevents a premature narrowing of the broad communication into the nose. The tendency for openings in the nose to close which have not been treated with a plastic step is well known.

During the first part of the after-treatment, the discharge would freely pass into the nose. I do not agree with Kuemmel that after removal of the floor of the frontal sinus the lateral parts of the frontal sinus are easily shut off by cicatrices if the cavity is a large one, because it is just the lateral and the deep occipital parts of the large cavities which are filled in with the orbital soft tissues. The nasal part of the cavity remains a funnel which does not obliterate, but is only in part filled with granulation tissue and in part lined with nasal mucous membrane. This part of the wound must naturally remain in broadest communication with the nose and must not become the seat of a retention of discharge. The swelling of the soft parts after resection of the floor of the frontal sinus is more pronounced in young individuals than in old, and more pronounced in people with prominent eyeballs than in those with deep-set ones.

In Case 1, the periosteum of the orbit was adherent in one place and considerable of the orbital fat protruded, which interfered somewhat with working at a depth. It is especially important that the floor of the frontal sinus be regularly removed up to the point of junction with the upper wall so

that no bony recess may remain. As the first case was operated on before Killian's publication appeared, I had the same experience with suture of the wound as the author of the method. I feared at first to suture the wound primarily and introduced vioform gauze. In the subsequent cases, the wounds were all sutured with the best results. In not a single case was there a stitch-hole abscess, and I think this was probably due to the use of wire as a suture material. Killian recommends celluloid thread because stitch-hole abscesses are very frequent in the use of silk. These suppurations are especially undesirable as the cosmetic result is disturbed by them. The very thin silver wire which Witzel now almost exclusively uses I have found excellent for this purpose, because it can be sterilized by boiling and offers the greatest protection against imbibition.

A disturbance of primary union, excepting in Case 1, occurred only in Case 3. A mistake in the sepsis was probably not present. I should be more inclined to regard as responsible the acuteness of the suppuration and consequently the pyogenic organisms. The case-history shows that the patient had suffered from the formation of scabs in his nose for years, but the severe pain had lasted only one week. It was unquestionably a case of acute exacerbation of chronic suppuration and the primary suture failed just as in Case 14 of Killian. Killian recommends, in connection with this experience, to suture only secondarily in such cases. The question naturally arises, Where does the acute stop and the chronic case begin. In Case 6, where such severe subjective symptoms and such severe pressure pain were present, an acute exacerbation surely seemed to be the correct diagnosis. Notwithstanding, recovery with primary suture was smooth.

In regard to the pyogenic organisms in Case 3, the condition found was an unusual one. In empyemas of the accessory cavities, creamy or muco-pus is present, and the crusts are only formed when the discharge is slight. In this case, from the beginning scabs were formed resembling in color and consistency those occurring in ozæna, but they were not foetid. In water they broke up in grayish-white thick pieces.

Microscopically, diplococci were found to be the pyogenic organisms.

The slight disturbances occurring in the healing in Cases 2, 4, and 6 can not be regarded as disturbances of healing by primary intention. In Case 2, two weeks after the operation, a small pustule appeared in the lower part of the cutaneous incision.

In Case 6, catgut ligatures were cast off from a number of similar pustules. In Case 4, seven days after the operation, a small quantity of pus was evacuated, and in Case 6, on the fifth day, a certain amount of chocolate-colored fluid had collected under the skin and was evacuated after an incision. In both of these cases the condition was probably one of hæmatoma.

The great service which the wet dressings with boric acid served led me to continue their use in the later cases even without disturbance of the wound-healing, thinking that the moist heat exerted a beneficent influence upon reparation in the deeper layers.

I used glass drainage-tubes as large as lead-pencils with lateral openings. These were introduced into the nasal angle of the wound cavity. The removal took place in Case 2 on the tenth day, in the other cases on the fourth or fifth day. The sutures were always removed on the fourth day.

No pain was complained of after the operation. The subjective condition of the patient as well as the favorable course of the wound-healing made a longer stay than fourteen days in the hospital unnecessary.

Healing is a relative conception in these cases. Even after the use of Killian's method, in the presence of the complicated structure of the accessory cavities of the nose healing in the anatomical sense may not always be possible. We must speak of a healing in the clinical sense when (1) the cutaneous incision is closed; (2) the frontal-sinus region is no longer tender on pressure; (3) no marked diplopia; (4) the patient is able to work.

Case 4 presented some unusual features. It was noticed during the after-treatment that the skin of the forehead over the frontal depression sometimes exhibited respiratory

movements. The tissue at the nasal entrance to the operative wound remained thickened and oedematous. This was easily explained by the continuing suppuration from the maxillary antrum. The respiratory movements of the frontal sinus are very remarkable and can be explained only by the formation of a duct in place of the bony frontal sinus. This duct had probably become lined with a pyogenic membrane and discharged pus, especially when a cold in the head or an injury exerted an unusual irritation. Owing to the distensibility of the anterior wall and the presence of retention, this suppuration produced no symptoms and will probably not require another operation.

Case 5 was a woman. Notwithstanding a satisfactory condition of the scar and the interior of the nose, the subjective symptoms persisted. It is to be remembered that this unmarried woman of forty-six years was already suffering from climacteric disturbances, from tinnitus, and other nervous symptoms. At the same time, it cannot be assumed that all these complaints were without reason, as the removal of the rest of the middle turbinal caused an amelioration in most of the symptoms.

The necessity of a further operation was present in Cases 3 and 5. In Case 3, the frontal sinus was completely obliterated. The normal skin of the forehead covered a painless depression over the right eyebrow. There was no swelling or redness. The patient is a policeman and is able to do his work in all kinds of weather, though the scab formation in his nose continues and occasionally gives rise to severe headache in the right frontal sinus.

In Case 3, the possibility exists that the left frontal sinus became subsequently infected through dehiscences in the interfrontal septum. This, however, is not in accord with the normal condition of the skin of the forehead over the depression and the absence of pain in the region of the left frontal sinus.

In Case 8, notwithstanding the perforation of the septum, no infection occurred.

The cosmetic results are, with the exception of the atypical Case 1, excellent. The scar caused a deformity in no case

and often could be seen only with difficulty. It seems hard to understand how Lermoyez objects to Killian's method on account of keloid scars. This author has presumably seen only cases which were operated on before Killian had perfected his method. Though the scar does not cause any deformity, the presence of a depression over the affected frontal region is to a certain extent unpleasant. In large frontal sinuses this depression is very noticeable. But in order to judge of a cosmetic result it is not right to compare a person operated on according to Killian with a normal person, but rather with some one operated on by another method. My personal experience comprises patients operated upon by removal of the anterior wall, by removal of the anterior and inferior walls, and those where an incision was made in or above the eyebrow, and the frontal sinus was simply opened in the anterior wall and after-treatment was carried on by packing and irrigation. The latter method, which can probably be regarded as obsolete, makes a great deformity, especially if the incision is above the eyebrow. A keloid-like scar forms after the wound has been kept open for a long time, especially if the skin has been retracted after a suppuration of the frontal sinus.

It need not be mentioned that the removal of the anterior and lower walls without the preservation of a bridge produces a very decided deformity.

As regards the prevention of a deformity, Kuhnt's method most nearly resembles Killian's, except that in Killian's operation the orbital soft parts fill out the operative cavity, and this gives the method an advantage in a cosmetic sense. The resulting depression is not striking. In Case 5, it was not at all noticeable. In Case 4, notwithstanding the extension of the frontal sinus upwards, the depression is relatively shallow, which is due to the careful removal of the edges of the wound and the relative moderate depth of the cavity. In Case 6, which had been operated on elsewhere with considerable deformity, the cosmetic result was improved by the second operation, as the old scar in the forehead is no longer drawn into a defect in the frontal sinus, but lies in a flat depression. In Cases 2 and 3, where unusually large

frontal sinuses were present, deep depressions exist. Notwithstanding this, the cosmetic result, compared to other methods, is an excellent one. The correction of this deformity by the injection of paraffin can be considered if necessary.

My experiments with Killian's operation have been so satisfactory that I consider it to be therapeutically and cosmetically the best treatment for chronic empyema of the frontal sinus, and shall henceforth perform no other.

In conclusion, I should like to add a few words on the diagnostic value of transillumination of the frontal sinus. I have been an adherent of diaphanoscopy for a long time. Not that a negative result has always been an indication for therapeutic procedure, but in cases where the two frontal sinuses were equally translucent I have decided upon an absence of pus and granulation tissue. This view has had to be changed on account of the experience in Case 8.

The opponents of transillumination have admitted that an obscuration of one frontal sinus in the beginning of treatment and the return of its translucence can be of diagnostic value. In Case 8, this has not proved true. As can be seen from the case-history, in the beginning of treatment the left frontal sinus was dark, then became translucent, and on the return of the patient was absolutely bright. The two translucent areas were absolutely congruent and corresponded to the dimensions of a normal frontal-sinus, and were sharply distinct, and it seems to be unquestionable that the frontal sinuses were translucent. The operation on the two sinuses, two days later, showed that both large frontal sinuses were of the same size and had very thin anterior walls. The right one was normal, and the left one was filled with muco-pus and a thick layer of granulation tissue. The translucency of a frontal sinus, therefore, does not prove the absence of an empyema.

If, however, a severely diseased frontal sinus, as in our case, remains translucent, just as the healthy one on the other side, it shows that diaphanoscopy can no longer be regarded as an aid for diagnosis.

ON THE OPERATIVE TREATMENT OF OTITIC INTRACRANIAL COMPLICATIONS.

BY PROFESSOR DENKER, OF ERLANGEN.¹

(With Plate I., *Zeitschr. f. Ohrenheilk.*, Vol. XLIII.)

Abridged Translation by Dr. C. H. R. JORDAN, New York.

THESE six cases of intracranial complications followed acute and chronic purulent otitis and were all operated upon; they illustrate the path along which infection from the middle ear may extend.

It is well known that bacteria and toxins may pass to the endocranium by way of all of the tympanic walls, with the exception of the outer wall, and by way of the bony surfaces of the mastoid process, which border on the middle and posterior cranial fossæ. The infection may travel along bony and vascular channels, as well as through defects in the bone, which are not infrequent in the roof and in the floor of the tympanum. The process may further lead to destruction of a window-membrane or a part of the labyrinth wall, and gain access to the posterior cranial fossa through the labyrinth, or it may directly reach the interior of the skull after carious disintegration, or necrosis of an area of a bone directly adjoining the brain.

In addition to the more frequent otitic complications, we find rarely serous meningitis, a condition which has not as yet been demonstrated at autopsy, œdema of the brain, and cerebral embolus in otitic thrombosis of the carotid artery.

¹ Read before the Medical Society in Hagen i. W., with presentation of cases and specimens.

Case 1.—Mastoiditis and perisinuous abscess in acute otitis media.

F. W., fifty years old, had been suffering from an acute inflammation in his right ear for ten days when he presented himself for treatment on April 16, 1901. The middle ear was discharging freely through a small perforation in the upper posterior quadrant which was bulging. Moderate tenderness over the antrum and along the posterior border of the mastoid. There was no pain and no general disturbance whatever. Pulse and temperature were normal. In spite of daily treatment and application of ice, the mastoid tenderness became more marked and the posterior meatal wall began to sag.

April 24th, Operation.—Soft parts slightly infiltrated; whole mastoid filled with pus; cell-structure largely destroyed. Pus is seen to ooze from a fistulous defect in the sigmoid sulcus; its enlargement leads to a perisinuous abscess containing over a teaspoonful of pus. The sinus wall seems somewhat congested but otherwise normal. The subsequent course was uneventful. The function was completely restored and the wound closed in ten weeks.

Remarks.—The perisinuous abscess, if not evacuated in time, might have caused sinusphlebitis and general pyæmia. There were no symptoms pointing to the presence of an extradural abscess—save, perhaps, tenderness along the posterior border of the mastoid. Considering the frequency of extradural abscesses in the posterior fossa, it would seem advisable to lay bare the sinus in all cases where the suppurative process has reached the bony sulcus.

Case 2.—Extradural abscess in middle cerebral fossa and fistula in external semicircular canal in chronic otitis media.

F. F., ten years of age, has chronic suppuration of the right middle ear, following scarlatina. No general symptoms; no pain; no vertigo. Tympanum filled with granulation tissue; total defect of membrane; no trace of ossicles. The fœtor persists in spite of long-continued treatment.

Radical Operation, Sept. 22, 1900.—Bone sclerosed. Antrum enlarged; filled with cholesteatoma. A carious defect in the tegmen leads to an extradural abscess containing 8 to 10ccm of very offensive pus. The dura is exposed as far as covered with granulation tissue and the latter scraped off. Another carious defect is

found on the external semicircular canal; whenever the exposed membranous canal is touched with a probe the head is invariably turned in the opposite direction. Koerner meatoplasty. Wound epidermized within ten weeks.

Remarks.—There were no symptoms to indicate the presence of an extradural abscess, or of a labyrinth fistula; evidently the exposed labyrinth had not yet been infected.

Case 3.—Temporo-sphenoidal abscess in chronic otitis media sinistra. Operation. Recovery.

Same patient as Case 2. Left ear.

Status Præsens.—May 28, 1900. Discharge very profuse and offensive; canal obstructed by polypi. Mastoid very tender on pressure. Headache, vomiting, dizziness. Temperature, A.M., 101°. Pulse 70. Percussion of squama very painful. No optic neuritis; no cerebral symptoms.

Radical Operation.—Cholesteatoma in antrum; polypoid granulations in aditus and tympanum. No ossicles found. Carious defect in tegmen antri; dura is laid bare as far as covered with granulations ($2 \times \frac{3}{4}$ cm). The latter are scraped off, and an exploratory needle is thrust into the temporal lobe from below upward. The second puncture strikes the abscess. The dura is then incised, a forceps introduced, and a tablespoonful of offensive pus evacuated. With the finger a distinct abscess membrane can be felt. Cavity is packed with iodoform gauze. From the second day, temperature and pulse remained normal, and recovery was rapid and uninterrupted. Cerebral wound healed June 23d. Epidermization of middle ear complete in eighteen weeks.

Remarks.—The clinical symptoms—mental dulness, headache, nausea, dizziness, slow pulse—were those of increased intracranial pressure, and suggested the presence of an extradural or cerebral abscess. Localizing symptoms, however, as aphasia and hemiplegia, were absent.

Case 4.—Temporo-sphenoidal abscess, extradural abscess, and subperiosteal abscess. Recovery.¹

E. T., seven years old, was brought to me October 8, 1900, with chronic suppuration of the right middle ear and grave intracranial symptoms.

¹ Reported extensively in the *Deutsche medicinische Wochenschrift*, 1901, No. 2.

Status Præsens.—Defect of drum membrane; tympanum filled with macerated epidermis; mastoid tender; temporal region infiltrated, very sensitive. Swelling of retromaxillary glands. Temperature, A.M., 99°. Pulse 72, somewhat irregular and tense. Vomiting. Marked apathy. Severe headache. Gait staggering. Pupils equal, react promptly.

Oct. 9th.—Somewhat better under application of ice. Temperature 98.8°. Pulse 71. P.M.: Temp. 97.2°; pulse 70.

Oct. 10th.—Rapid change for the worse. Vomiting. Right pupil becomes dilated and without reaction within a few hours; distinct optic neuritis. Left eye normal. Urine voided involuntarily. Coma. Temperature 96.8°. Pulse 60.

Radical Operation.—Antrum, aditus, and tympanum filled with offensive pus and cholesteatoma. No communications between middle ear and endocranium. The incision is extended upward and foetid pus found underneath the periosteum. The middle fossa is entered by making an opening (the size of a quarter) into the squama; the tegmen tympani is also removed. A teaspoonful of extradural pus is evacuated. The dura, covered with discolored granulation tissue, bulges into the opening. After a successful puncture, the dura is incised and cerebral abscess evacuated. It had the size of a hen's egg, and contained 70–80ccm of foetid, sanguinolent pus. A distinct membrane could be felt. After the evacuation, the dilatation of the right pupil disappeared; the pulse rate went up to 86. No more vomiting. Undisturbed recovery followed. The abscess cavity healed within eight weeks; middle ear epidermized (with permanent retroauricular opening) in five months.

Remarks.—The general cerebral symptoms observed were: severe headache, slow pulse, staggering gait, and mental apathy. The optic neuritis was confined to the eye of the affected side, the fundus of the opposite eye showing no pathological changes whatever. The occurrence of one-sided optic neuritis in cerebral abscess had been denied by Macewen and Körner. Statistics of the Halle Clinic, however, recently published by Hansen, show that optic neuritis in cerebral abscess was bilateral in 87.5 % of the cases, while the eye of the affected side alone was involved in 12.5 %. The only focal symptom was the partial paresis of the oculomotor nerve. It was observed that at the moment of

the evacuation of the abscess the mydriasis disappeared, and the pulse rate rose. The temperature was largely subnormal before and for several weeks after the operation.

Case 3.—Multiple cerebellar abscesses ; basilar meningitis. Death.

H. T. has been suffering from acute otitis media after influenza, since Oct. 2, 1901.

Oct. 22d.—Profuse discharge, bulging of Shrapnell's membrane, small perforation above short process ; moderate tenderness over antrum.

Oct. 26th.—Great apathy, vomiting, subnormal temperature, pulse 80. Pupils somewhat sluggish.

Nov. 2d.—Temperature 96.2° – 97.8° . Pulse 60–70. Respirations 11 to 14. Headache. Mental dulness. Retention of urine. Pupils equal but sluggish. Fundi normal. No paretic symptoms.

Operation, 6 p.m.—Mastoid cells filled with granulation tissue, bone very soft. In order to explore the tegmen tympani, a radical operation is done. The whole tegmen is removed and the adjoining bone back to the sinus. The exploring needle is thrust into the temporal lobe five times without result. The cerebellar dura is then exposed behind the sigmoid sinus ; it shows no pulsation. The third puncture strikes the abscess, which is drained in the usual way. It contained 7 to 8ccm non-odorous creamy pus ; no limiting membrane could be felt.

Nov. 3d.—No more vomiting, no headache.

Nov. 4th.—Temperature 97° – 98.4° . Pulse 80–72. Patient feels well.

Nov. 5th.—Temperature 96.8° – 97.5° . Pulse 68–60. Vomiting. Dressing changed under narcosis. Little discharge from cerebellum.

Nov. 6th.—Temperature 96.4° – 97.4° . Pulse 70–80.

Nov. 7th.—Vomiting.

Nov. 8th.—Prolapsus cerebelli.

Nov. 9th.—Beginning optic neuritis in left eye ; deviation of the eye toward the right. Vomiting. Temperature down to 95.9° .

Nov. 11th.—Good appetite; no vomiting. Marked bilateral optic neuritis.

Nov. 12th.—General condition and appetite good. Pulse 76–89. Temperature 97.4° .

Nov. 13th.—Vomiting.

Nov. 14th.—Mobility of eyes better. Vision of left eye diminished. Patient recognizes a watch but cannot make out the time. Paresis of left arm and leg. Appetite good.

Nov. 18th.—Optic neuritis increased in left eye; distinct "choked disc."

Nov. 23d.—Repeated vomiting; some headache. Vision, R $\frac{1}{4}$ L $\frac{1}{8}$.

Nov. 28th.—Vision, L $\frac{1}{8}$.

Nov. 29th.—Vomited all night. Pulse 60. Temperature 96.2°. 10 A.M., removal of prolapse (size of walnut.) Incision into cerebellum opens a new abscess containing $1\frac{1}{4}$ tablespoonfuls of pus. Cavity drained with iodoform gauze. Pulse 80–90. Left eyesight better.

Dec. 2d.—Vomiting. With left eye patient cannot see the time.

Dec. 3d.—Headache. Pulse 62. Retention of pus; relieved by probing.

Dec. 4th.—Pulse 78–116. Temperature 97.0°–97.8°.

Dec. 5th.—Headache. Temperature to 103.0°. Pulse to 130.

Dec. 6th.—Meningeal symptoms.

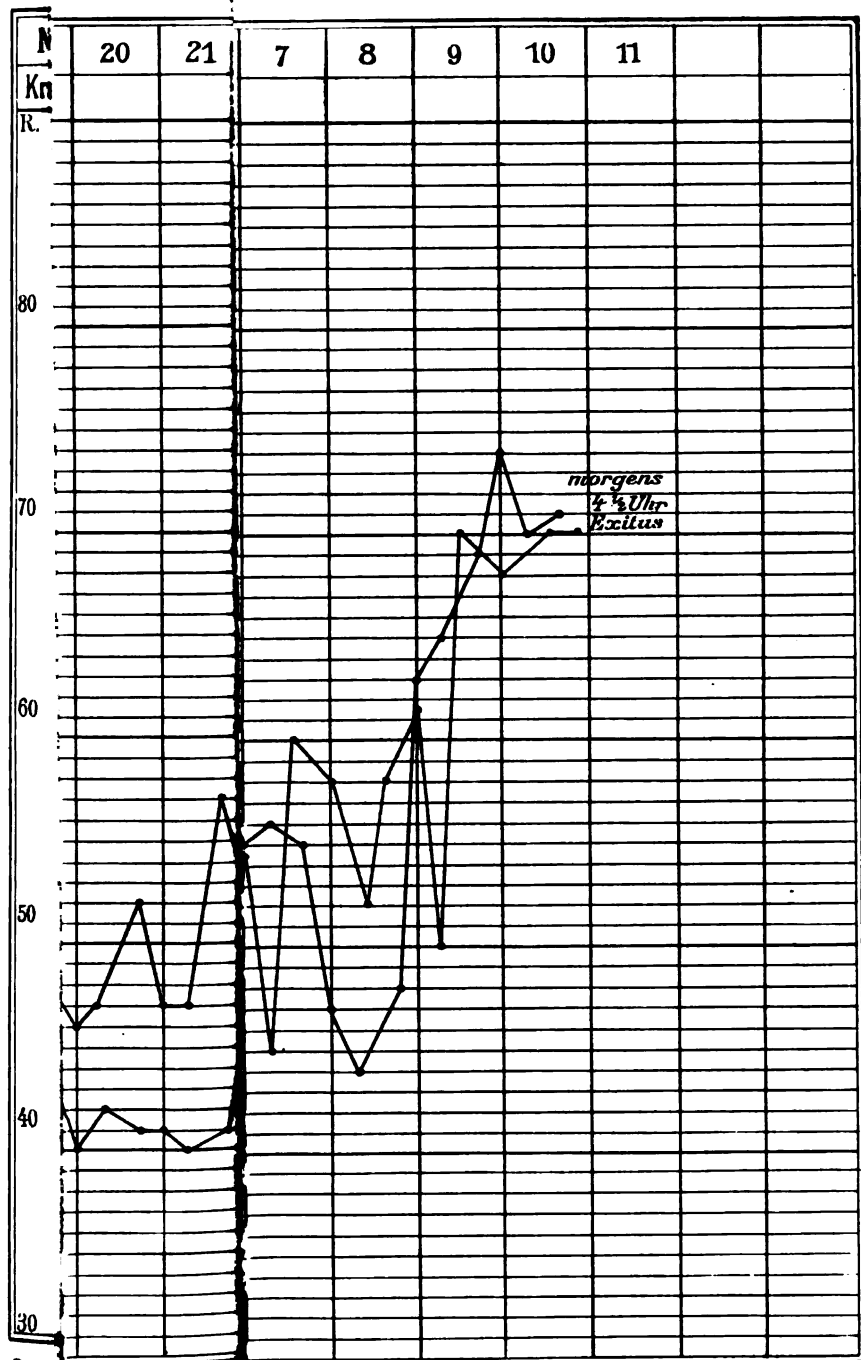
Dec. 10th.—Coma; left eyelids swollen.

Dec. 11th.—Death.

Autopsy.—Transverse and sigmoid sinus free. Besides the abscess operated upon, two more abscesses (one small and one large) were found in the left cerebellar hemisphere. Purulent basilar meningitis. The larger one of the two above mentioned abscesses had broken into the arachnoidal space. Phlebitis of cavernous sinus.

Remarks.—The most remarkable feature of the case is the rapidity with which the inflammation of the middle ear was followed by an intracranial complication. The ear had begun to suppurate on October 2d, and only one month later, on November 2d, a large cerebellar abscess was evacuated, which must have been five to six days old then. Regular ophthalmoscopic examination proved to be of considerable clinical importance; at times the increasing optic neuritis was the only phenomenon pointing to intracranial mischief, while all the other symptoms had temporarily disappeared. The development of a distinct "choked disc" with diminished vision is decidedly rare.

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Case 6.—Pyæmia in acute otitis media.

E. L., thirty-six years old, contracted an acute pain in the right ear, after influenza, on November 23d or November 24th. Incision of membrane. Application of ice. Daily treatment.

Dec. 7th.—Mastoid very tender.

Dec. 11th.—Sagging of posterior meatal wall. Temperature 102.0°.

Dec. 12th.—Severe chill. Temperature 104.2°. Pulse 125.

Operation.—Soft parts and corticalis normal. Whole mastoid filled with pus and profusely bleeding granulations. The sinus is laid bare for an inch; its wall appears smooth but somewhat discolored. Puncture is negative. No reaction.

Dec. 13th.—Temperature to 102.5°. Pulse 86–110.

Dec. 14th.—Temperature normal. Uneventful recovery. Wound healed thirteen weeks after operation.

OTITIC BRAIN ABSCESS.

BY PROF. V. UCHERMANN, KRISTIANIA.

Abridged Translation by ADOLPH O. PFINGST, M.D., Louisville, Ky.

A.—STATISTICS AND PATHOLOGY. REPORT OF CASES.

ACCORDING to the statistics of Pitt, brain abscess occurred in 0.62 % of 9000 cases, 40 % of which were of otitic origin. In the Reichshospital of Kristiania, brain abscess was found thirty-five times in 6085 post-mortems, or in about 0.57 % of the cases. In the ten years, from 1892 to 1902, eleven cases of brain abscess originating in the ear were observed, three of which occurred in children. Eight occurred in males and three in females, which corresponds to other larger statistics. In ninety cases reported by Koerner, it occurred in the male sixty times. Three of my cases occurred in acute and eight in chronic suppurative otitis, which corresponds to the observation of Hammerschlag, who gives the proportion as 25 % in acute otitis and 75 % in chronic. The abscess in nine of my cases was situated in the temporal lobe and in the other two in the cerebellum, the ratio agreeing with Koerner's collected cases. Of 267 operated cases, 212 occurred in the temporal lobe. All of the abscesses were situated within 1 cm of the surface, and in several it bordered directly on the dura. In three of the cases, pus was found between the dura and the bone. This observation corroborates the statement of Koerner, that otitic brain abscesses are always in close proximity to the diseased ear or bone. In the two cerebellar cases, the connecting link of infection was the sinus. This contradicts the

teaching of Jansen and Koerner, that phlebitis and infected thrombosis play a very unimportant part in the etiology of otitic brain abscesses.

The size of the abscess cavity in my cases varied from that of a hen's egg to that of a hazel-nut. Their contents also varied. Some contained green or yellowish-green thick pus, some a more watery material, and some a very tenacious pus. While the contents was very foul in most instances, in several it was practically odorless. In three of the cases, the abscess was walled off by a pyogenic membrane. The membrane was composed of granulation tissue and was *1mm* thick in two of the cases and from 6 to *8mm* in the other. The one with the thick capsule took 128 days to develop, the others from twenty-four to thirty-eight days, there being an apparent relation between the length of the period of development and the thickness of the abscess wall. In those cases without a capsule, the cavities were irregular and the surrounding structures soft and at times infiltrated with blood. It seems that the size of the cavity also bears some relation to the duration of the development. In two, or 18 %, of the reported cases, multiple abscesses were found. Koerner in 100 cases reports 15 % of multiple formation. Six of my cases were submitted to operation, with a cure of 50 %. Koerner's records give a recovery in 50.2 % when situated in the cerebrum, and 52.8 % when in the cerebellum.

My cases in brief are as follows :

CASE 1.—Male, aged twenty-two, with o. m. p. chron. on both sides. When the patient was first seen, the nasal septum had a perforation about the size of a bean, and behind the perforation, on the floor of the nose, a nodular lupous mass was visible. About two months later, notwithstanding frequent irrigation of the ear, the patient complained of frequent pain behind the left ear, and a modified Stacke was resorted to. After doing well for about a month, the tip of the mastoid became sensitive. The entire process was removed and the patient again improved. Five months later, symptoms of brain abscess developed. The patient became restless, and he complained of pain on the left side of the head. There was some nausea and vomiting, high temperature, aphasia, and the patient seemed in a stupor. The

tegmen of the mastoid was removed and an exploratory puncture made into the temporal lobe to the depth of $1\frac{1}{2}$ inches, but failed to bring pus. The patient rapidly grew worse and died several days after the last operation.

At the *post-mortem*, almost the entire transverse sinus and some of its branches were found filled with a grayish-yellow thrombus. In removing the brain, the left temporal lobe ruptured, and very near its apex a small abscess cavity, holding about a tablespoonful of foul pus, emptied itself. Portions of the dura contained granular deposits which were recognized microscopically as tubercles. The tubercle bacillus was also demonstrated in the abscess wall.

The points of interest in this case were the tubercular deposits on the dura and around the abscess cavity, and the lupous condition of the nose indicating the nature of the infection. The location of the abscess in the posterior portion of the temporal lobe away from the tegmen and the presence of thrombus masses in the cerebral veins would indicate origin of the brain abscess in this way.

CASE 2.—A boy, nine years old, with history of otorrhœa on left side of several years' duration, had complained of headache for a week when he was admitted to the hospital for treatment. He had had frequent chills, occasional flushing of the face, his appetite was entirely lost, and for several days he had been vomiting occasionally. There had been some swelling behind the left ear for several days. Soon after his arrival at the hospital, he had a convulsion and passed into a state of unconsciousness. His pulse was 92, temp. 38.5° C. The pupils were dilated and not responsive to light. The equilibrium of the ocular muscles was not disturbed, but there was a slight ptosis. A large fluctuating mass was present behind the left ear. This was incised and two tablespoonfuls of green foetid pus evacuated. The mastoid cells were filled with pus and granulation tissue. The sinus was exposed in removing the necrosed bone and was found tense and pulsating. The dura over the tegmen antri and tymp. was also tense. Incision into the dura and brain substance in the median line exposed an abscess cavity. It was 1 cm from the surface and contained $1\frac{1}{2}$ tablespoonfuls of greenish-yellow foul pus. Drainage tube was inserted. Notwithstanding good drainage, the pulse rate increased to 150 and became irregular, the pupils became contracted; there was some muscular twitching of the lower

extremity. Coma continued, and death followed twenty hours after the operation.

At the *post-mortem*, the abscess cavity was found to be as large as a hen's egg and to occupy the posterior half of the temporal lobe and the anterior end of the occipital. The bone surrounding the tympanic cavity had undergone considerable destruction.

The diagnosis of brain abscess in this case was based upon the history of vomiting followed by a period of quiescence, later repeated vomiting, headache, and finally convulsions and coma. The dilated pupils and ptosis on the left side were aids to the diagnosis. The elevation of temperature and acceleration of pulse before death were evidently due to encephalitis.

CASE 3.—Male, thirty-one years of age, had been suffering for two weeks with acute pains in the left ear and vertex. He had also had chills, elevation of temperature, and vomiting. When admitted to the hospital, he had a subnormal temperature, 35.8° C., slow pulse, 56, and he was still suffering severely from headache. There was slight drowsiness and apathy. No paralyses or other focal symptoms. Pus was discharging from the left ear canal and the mastoid was slightly sensitive to pressure. The simple mastoid operation was undertaken and pus and cholesteatomatous material found in the antrum and attic. The antrum and attic were cleansed and the posterior wall of the ear canal removed. The condition of the patient improved for several days after the operation, the patient being able to sit up, sleep, and take nourishment; pulse 52, temp. 36.7° C. Headache continued, and on the third day after the operation the patient began to grow worse. He became more drowsy and finally went into coma. His pupils were irregular. No vomiting; no paralyses; pulse 52; temp. 38° C. The urine contained albumen. Death followed in twenty-four hours. An autopsy was not granted.

Although the slow pulse and low temperature indicated brain abscess in this case, the retention of the intellectual faculties, the absence of focal symptoms, and the short duration of the trouble influenced the operator in doing a simple mastoid operation rather than explore the brain.

CASE 4.—A girl, twenty years old, with history of otorrhœa on the left side for two years. For some time there had been pain

in the left ear, chilliness and rigidity of the neck. There was no dizziness, vomiting, or disturbance of motion or sensation. Somnolence was marked, and she would answer questions intelligently, but in a disinterested way. Pulse 100, temp. 39.3° C. The ear canal was swollen, thereby covering the drum. The tip of the mastoid was very sensitive to pressure, and the tissue below the bone was indurated and swollen. As the mastoid cells and antrum were, at the operation, found filled with pus and granulation tissue, the entire bone was resected and the posterior osseous wall of the meatus removed. The dura was not exposed. Although apparently less sleepy and with undisturbed intellect on the following day, the patient continued to complain severely of pain in the left ear, temp. 39.3° C., and as the day progressed she became more and more restless and complained of dizziness. She finally lost consciousness and died about twenty-four hours after the operation.

At the *autopsy*, a fistulous opening about the size of a large needle was found on the under surface of the temporal lobe, which led to an abscess cavity about as large as a marble, and this in turn communicated with the lateral ventricle. A small quantity of pus was found between the bone and dura. There was no perforation of the bone. The left transverse sinus contained a yellowish broken-down thrombus.

The only symptom in this case indicating the presence of a brain abscess was the stupor, the pulse being rapid and temperature high. Hence the presence of the abscess was overlooked.

CASE 5.—Female, twenty-five years of age, with history of otorrhœa on right side of seven years' duration. For eight days she had complained of severe earache on the right side, accompanied by chills, hot and cold flushes, and headache. There had been no vomiting, but upon arising she complained of dizziness. When admitted for treatment, the patient had a pulse rate of 105, temp. 39.3° C. Fœtid pus and cholesteatomatous masses were found blocking the meatus. High temperature, ranging from 37° to 40° C., continued for several days, pain increased in the frontal and occipital regions, and there was slight stupor. Operation was decided upon. The antrum and attic were found filled with a cholesteatomatous mass, the mastoid cells filled with pus, and pus also escaped from under the bone, where the lateral sinus was

exposed. The entire mastoid was resected. After slight improvement of several days, the patient began to grow worse. The headache became intolerable, especially in the occiput; there was frequent vomiting, and the intellect became more or less clouded. Pulse 60, temp. 37.3° C. Two weeks after the first operation, more bone was removed in a backward direction, exposing about an inch of the sinus. It was bulging and its walls were apparently thickened. Free incision evacuated about 100 grams of grayish-green pus. A drainage tube wrapped in gauze was inserted and a bandage applied. Improvement was again of short duration, the headache persisting. The patient soon became more drowsy and at times delirious, and a week later was again subjected to an operation. At this time, an abscess cavity was found in the temporal lobe about 5 cm from the surface and a tablespoonful of pus removed. The symptoms became more and more grave, and five days later it became necessary to again incise the sinus, which was bulging above the point of the first incision. Pus was evacuated. The sinus wall was dissected out as far as the knee. The patient went from bad to worse, the pupils became widely dilated, nystagmus developed, paralysis of the left abducens, aphasia, optic neuritis, and she finally died, five days after the operation, in coma.

At the *autopsy*, one large abscess and several smaller ones were found in the left temporal lobe. The left hemisphere of the cerebellum also contained an abscess as large as a hazel-nut. The ventricles were normal.

The only early indication of cerebral abscess in this case was the sluggish cerebration. After resection of the mastoid, symptoms indicative of cerebellar abscess developed. The pulse became slower, temperature returned to normal, stupor increased, headache continued. There were no focal symptoms. Exploratory incision behind the lateral sinus failed to expose pus, and it was only reached by removal of the sinus wall and exposure of a greater area of cerebellar surface. The abscess in the temporal lobe was evidently secondary to the cerebellar abscess.

CASE 6.—Male, age twenty-six, with history of otorrhœa of short duration on the right side, about six weeks before he was seen at our clinic. For several days before he was seen, he complained of annoying dizziness, chills, pain in the head, especially

on the right side and occiput, muscular twitching, vomiting, defective vision, and a tendency to diplopia. When he arrived at the hospital, most of these symptoms were still present. His mind was clear. Pulse 72, temp. 37.3° C. The pupils were dilated, and there was beginning of optic neuritis on both sides. The drum membrane was swollen and there was sinking of the superior-posterior wall of the ear canal. The mastoid was resected, and normal sinus and dura exposed. After several good days the patient grew worse. His pulse became slow, 56; temp. 37.2° C.; he became drowsy, and his mind seemed sluggish. Ten days after the operation, an exploratory puncture was made in the temporal lobe with a negative result. Somnolence increased, vomiting became more frequent, and slight coma began to develop. Later there was improvement, the patient being able to sit up, but five weeks after the first operation the temperature suddenly rose to 44° , and the patient went into profound coma and died twenty-four hours later.

At the *post-mortem*, an abscess as large as a hen's egg was found on the under side of the right temporal lobe 1 cm from the surface. The lateral ventricles, especially the right one, contained greenish pus, but communication with the abscess cavity could not be found.

Beginning of optic neuritis was the only early indication, in this case, of brain abscess, and as this can be present in many other conditions, especially in serous meningitis, exploratory incision of the brain was not deemed justifiable at the first operation. With symptoms developing after resection of the mastoid, exploratory incision was undertaken although pus was not found. It was shown at the autopsy that the incision had been made directly through the abscess cavity. The tenacious character of the pus and the thickness of the abscess wall had evidently prevented the escape of pus at the time of the incision. The sudden death, after a period of relative improvement, was no doubt the result of involvement of the ventricles.

CASE 7.—A boy, in his twelfth year, whose right ear had been discharging pus for two and a half years, complained, for four days before his admittance to the hospital, of pain behind the right ear and right side of the head. He had vomited several times in the last few days. When examined, the ear canal was found

filled with foul pus, the walls of the meatus slightly swollen, and a large perforation in the drum. His pupils were wide and his eyes had a vacant stare. There was no paralysis or disturbed sensation of intellect. Pulse 90, temp. 37.5° C. The mastoid was resected and the antrum and attic, which contained pus and granulation tissue, cleaned out. In removing the bone upward and backward and exposing the sinus, one half teaspoonful of pus was liberated from beneath the bone (epidural abscess). This patient also developed symptoms of brain abscess several days after the operation. He became drowsy, at times comatose, restless, and vomited occasionally. Pulse 64, temp. 37° C. His pupils were dilated. Weak hand-grasp on the right side. The skull was trephined posteriorly in the cerebellar region, and an abscess, about 4 by $1\frac{1}{2}$ cm, located at the depth of 1 cm. The condition of the boy steadily grew worse. He became restless, vomited frequently, and was in a stupor most of the time. Later there was incontinence of urine. Optic neuritis marked. For several hours prior to his death, which took place three weeks after the first operation, he was in a comatose condition, but would frequently shriek aloud.

Three distinct abscess cavities were found at the *autopsy*, all situated in the cerebellum. On the median side of the one found at the operation there was a large one, the size of a walnut, and still farther inward a third one. The lateral ventricles were distended with a serous fluid. The transverse sinus contained a thrombus, which extended to the jugular bulb.

In this case, there were also few symptoms to lead to an early diagnosis, the stare and the vomiting being the only suggestive symptoms. After resection of the mastoid, frequent vomiting, dilated pupils, and weakness of the flexors of the right arm made the diagnosis of cerebellar abscess probable. Although a second search for pus was made when the symptoms continued after the discovery of the abscess, the other cavities were not entered. The restlessness and shrinking noted before the death of the patient were probably due to involvement of the ventricles.

CASE 8.—Boy of sixteen, who has had otorrhœa on the right side for three years, began, two weeks before his admittance to the hospital, to complain of headache and dizziness. A week

before his admittance, he had received a blow on the fronto-nasal region, and since then frontal and occipital pains have been constant. The dizziness also increased; there were great drowsiness, apathy, hot and cold flushes. Vomiting followed every meal. There was no disturbance of motion or sensation outside of constant twitching of the upper lip. When first seen he still complained of headache, and he was restless and morose. Pulse 52, temp. 36.9° C. The pupils were normal. The right drum was absent, and foul pus and cholesteatomatous material filled the meatus. The left ear was also discharging pus. Both mastoids were apparently normal.

Operation.—Resection of the right mastoid. The antrum was found filled with a mass of cholesteatomatous material. Upward and backward the dura was bare, and also anteriorly a little above the course of the facial nerve. After the operation, the temperature returned to normal, but the pulse remained slow, 56–64. The patient continued drowsy, and complained somewhat of headache. He vomited frequently. Six days after the operation, the dura, where it was exposed behind the sinus, was incised, and a quantity of softened brain matter evacuated. The aspirator was introduced into the brain substance, and at the depth of 1 cm entered a cavity, from which a large quantity of stinking green pus was withdrawn. The bridge of bone between the two exposed surfaces found at the first operation was removed, the abscess cavity irrigated, and a wrapped drainage tube inserted. After twenty-four hours, the symptoms of brain abscess began to abate, following which there was continued improvement and perfect cure, the drainage tube being removed in three weeks.

In this case, the symptoms of brain abscess developed early, headache and dizziness being present for two weeks before the patient was admitted to the hospital, and drowsiness for a week. Vomiting had also taken place, and his pulse was slow, 52, and temperature 36.7° C. As the drowsiness and vomiting continued and despondency developed after resection of the mastoid, the abscess was searched for six days later, found, and evacuated. The despondency continued for several days after evacuation of the pus, but the other symptoms subsided almost at once, and the patient made a perfect recovery.

CASE 9.—A lad of seventeen, with history of otorrhœa on the left side of one and one-half months' duration. For the last eight days he had complained of dizziness, frontal headache, and he had had an occasional chill. Pulse and temperature were normal; cerebation clear. The left ear canal was filled with pus, the mastoid tender on pressure. The patient was subjected to a simple Schwartz operation, considerable pus being liberated. The sinus was exposed and found to be covered with granulation tissue. The dura was also exposed anteriorly and upward of the antrum. It appeared thickened and was pulsating. A small fistulous opening was found in it, from which pus was exuding and through which a probe could be passed into a cavity. This opening was enlarged and a quantity of pus and soft brain substance removed. A wrapped drainage-tube was inserted and bandage applied. Symptoms continued for about twenty-four hours, after which he improved rapidly and after several months was discharged in perfect health.

The early symptoms in this case, dizziness and frontal headache, with normal pulse and temperature, seemed insufficient to justify exploration of the brain at that time, and it was only by chance that the abscess was discovered after removing the granulations from the dura and exposing the fistulous opening.

CASE 10.—Male, forty-eight years old, had suffered with intermittent pain in the right ear and a discharge of pus for eleven weeks. He complained of vertigo, difficulty of maintaining his equilibrium, and temporal headache. When examined, there was tenderness on pressure over the tragus on the right side and marked sensitiveness over the tip of the mastoid. The meatus contained pus. Pain was sufficient to prevent sleep. Pulse 64, temperature 36.4° C. In passing the curette inward from the antrum, while doing the Schwartz operation, a small portion of brain substance was removed so that resection of the bone was decided upon. The tegmen tymp. and antri were absent, and a non-pulsating mass covered with thickened dura almost filled the antrum. This was incised and a yellowish-white mass bulged into the antrum. The tumor now began to pulsate. The cavity was curetted and a wrapped drainage-tube inserted. As in the previous cases, symptoms continued for about twenty-four hours and then gradually subsided, the patient making a perfect recovery.

Temporal headache was the only indication of brain abscess in this case. The vertigo and disturbance of the equilibrium being common symptoms of disease of the labyrinth could not be taken into account. As in the preceding case, the abscess was found accidentally during the mastoid operation.

CASE 11.—A child, ten years old, was taken, a month before he was brought to the clinic, with vomiting, fever, headache, and a discharge from the right ear. He apparently recovered entirely from this attack, the otorrhœa ceasing and the temperature returning to normal. When admitted to the hospital he was in a stupor, though when aroused his mental faculties were clear. Pulse 60-70. Somnolence increased in the next two days, the patient lying in bed with his eyes closed. His pulse remained slow. The pupils were wide and reacted slowly to light. Optic neuritis was marked on the left side and was beginning on the right. Outside of a slight ptosis there were no focal symptoms. Emesis had occurred but once. The diagnosis of cerebellar abscess was made and operation decided upon. A partial resection of the mastoid was done and the trephine applied behind the lateral sinus and the dura incised. Aspiration of the right cerebellar lobe brought only a teaspoonful of clear serum. The skull was also trephined in front of the sinus, just over the parietotemporal suture, and the temporal lobe incised, but also with a negative result. After the operation, the pulse rate steadily increased, the temperature rose, and the restlessness became more marked. Five days after the operation, the patient had a convulsion and soon passed into coma, in which he died two days later. At the *autopsy*, an abscess cavity was found in the right temporal lobe 1cm from the surface. The ventricles were free of pus. In the hardened specimen it was found that the abscess cavity was as large as a hen's egg. It was irregular and was surrounded by a dirty reddish pyogenic membrane.

The diagnosis of cerebellar abscess in this case was based upon the drowsiness, slow pulse and normal temperature, vomiting, and vertigo. The puncture made into the temporal lobe just escaped the large cavity found at the post-mortem by 1cm, passing that far behind it. As there were no focal symptoms to denote cerebral involvement, a second puncture was not made. The slight ptosis was probably the

result of an accumulation of fluid at the base of the brain. This is indicated by the rise in temperature and acceleration of the pulse after the operation.

B.—SYMPTOMS AND COURSE.

Clinically the development of brain abscess has been divided into an initial, a latent, a manifest, and a terminal stage. Some authors, among them Macewen, consider the latent and manifest stages as one and recognize but three stages.

The symptoms of the initial stage are headache, evening temperature, with or without a chill, and vomiting. None of these symptoms is constant and we encounter cases where even the headache is wanting (Case 11). The duration of this stage has been placed at from twelve hours to a week. It can readily be understood that the arbitrary limitation of the first stage is of little importance, as it is impossible to determine just when the patient is passing into the next stage.

In the second stage, in which we will include the latent and manifest periods, a diversity of symptoms arises, which, for the convenience of study, have, by v. Bergmann, been classified into three groups. 1. General symptoms dependent upon the suppurative process. 2. General brain symptoms dependent upon the inflammatory process in the brain and the resulting increase in intracranial pressure. 3. Focal brain symptoms dependent upon the direct or indirect involvement of certain areas of the brain or of the cranial nerves.

1. General or constitutional symptoms: Under this head are included malaise, clay-colored complexion, emaciation, constipation, and anorexia. They are especially marked in children. The entire symptom-complex was present in case No. 2, with the exception of constipation, and in Nos. 3 and 8, with the exception of emaciation. In the other cases, only one or several of the symptoms were present.

2. General brain symptoms: Headache is the most pronounced of the pressure symptoms and was present in all but one of my cases. It occurs as a diffuse headache or as

a localized pain, principally in the occiput and frontal region. Sometimes it begins as a general headache and later becomes localized. The location of the pain usually does not correspond to the seat of the abscess, although in hemi-crania the abscess is nearly always situated on the painful side.

One of the most constant symptoms of brain abscess is vomiting. It may be present in the initial stage, the result of septic infection, or it may not develop until pressure symptoms arise. It is most pronounced in cases of cerebellar abscess. It occurred in all but three of my cases.

Dizziness, although not an infrequent symptom, is not as constant a symptom, even in cerebellar abscess. In my seventh case there was no dizziness, notwithstanding the multiplicity of abscesses. This symptom is not believed to be dependent directly on intercranial pressure. In many instances it is the result of simultaneous disease of the labyrinth. When it occurs independent of labyrinthine disease, it is most likely due to irritation of the auditory nerve, or if the abscess is in the cerebellum, to irritation of the middle lobe (vermis).

More or less disturbance of the sensorium is present in every case of brain abscess. It frequently manifests itself first in restlessness, drowsiness, and apathy. Sometimes it is manifested in stupidity (dull cerebration), somnolence, and finally in coma. The patients often become morose, irritable, and hard to please and may have spells of crying. As a rule, questions are answered intelligently when the patient is aroused from his apathetic condition.

Coma may be a temporary symptom and disappear after evacuation of the abscess, unless it be the final coma coming on shortly before death, with rise in temperature and acceleration of pulse, which is usually due to extension into the ventricles.

Convulsions are also common in brain abscess, especially in children. The only two of my cases in which convulsions occurred were in children. In two other cases muscular twitching took place.

An important sign of intercranial pressure is optic neur-

itis. It usually develops in brain abscess after the abscess has attained some size and is consequently considered one of the late signs. As optic neuritis is, in uncomplicated cases, the result of high intercranial pressure, it is also a common symptom of brain tumor, sinus phlebitis, or serous meningitis. The fundus was examined in but six of my cases and optic neuritis found in all but one. The pulse in uncomplicated cases of brain abscess with normal or sub-normal temperature is slow and full after the abscess has attained a certain size. It was slow in all of my cases but Nos. 1, 2, and 4, in which febrile disturbances caused the rapid pulse. As the slow pulse is due to pressure, it usually becomes slow late, about the same time that the optic neuritis develops, after the abscess has attained some size. An interesting feature of the pulse is the increase in rate after evacuation of the abscess.

3. Local (focal) symptoms: Local symptoms are due to (a) direct involvement of certain parts of the brain. The more common of these symptoms are word-deafness and disturbance in speech, when affecting the left temporal lobe, dysphagia, agraphia, and cerebellar ataxia, though none of them is frequent. Amnesic aphasia and paraphasia were observed in two of our cases of abscess of the left temporal lobe. In one of these cases agraphia was also present. Otherwise few symptoms, due to direct involvement of the centres, were observed in my cases.

Local symptoms may also be due (b) to indirect irritation or pressure of the centres. The indirect influence of pressure upon the centres is largely prevented by the presence of the tentorium. It protects the cerebrum when the abscess is in the cerebellum, and *vice versa*. The communicating fissures of the brain also offer a protection, especially as regards the œdema. However, the pressure may be transmitted inward as far as the internal capsule.

Muscular twitching, which is sometimes seen in brain abscess, is now generally looked upon as the result of meningeal inflammation. It usually occurs on the same side as the abscess, but frequently occurs on both sides (Nos. 6 and 11).

Remote pressure symptoms are especially prone to occur

in abscess of the cerebellum. The symptoms are weakness of the hand-grasp, which was present in Case 7, and rigidity of the muscles of the neck, which was observed in both of my cases of cerebellar abscess, and also in two cases of cerebral involvement (Nos. 3 and 4). This muscular contraction is believed to be a reflex action, having its cause in an irritation of the membranes of the cerebellum.

Another cause of local symptoms is (*c*) indirect involvement (pressure) of the cranial nerves within the skull. Instances of this kind were observed in Cases 2 and 11, where oculomotor paralysis was manifested in ptosis on the same side of the abscess. In Case 5, there was paralysis of the abducens nerve, also horizontal nystagmus. The lesion in this case was probably near the centre of associate eye movements in the corpora quadrigemina. Symptoms denoting involvement of the 4th, 5th, 7th, or 12th nerves were not noted in my cases.

The third, or terminal, stage of brain abscess is manifested in coma, with or without convulsions, and usually terminates in paralysis of respiration. This stage may come on suddenly, being ushered in with a chill, fever, rapid pulse, severe headache, and vomiting. In such cases, it is due to rupture of the abscess into one of the lateral ventricles or the sub-arachnoid space. Where rupture takes place into the arachnoid space, the comatose condition develops more slowly than in case of rupture into the ventricle. The terminal stage may come on gradually, the condition of somnolence slowly passing into coma, so that the beginning of this stage can not be well defined. Cases 4 and probably 3 illustrate the rapid development of coma, result of rupture of the abscess into the ventricle. In the other cases, progressive encephalitis was the cause of death. In Cases 1, 7, and 11, coma was not present.

In two of the cases of cerebellar abscess, and in one of the cases of abscess of the temporal lobe, complications were found in the form of sinus thrombosis. The cerebellar cases were also complicated by subdural abscess. Two other cases (Nos. 4 and 6) of abscess of the temporal lobe were complicated with meningitis.

C.—DIAGNOSIS.

The diagnosis of otitic brain abscess, which is nearly always difficult, is, in uncomplicated cases, based upon the history of an acute or a chronic suppuration of the middle ear, and on the gradually increasing symptoms of intercranial pressure, and on the drowsiness, absence of fever, slow pulse, and vomiting. This symptom-complex may also be observed in serous and tubercular meningitis and in tumors of the brain, which makes a positive diagnosis practically impossible without resorting to exploratory surgical means. By resecting the mastoid, the condition of the bone and the adjacent dura can be determined. Sometimes a fistulous opening leads to the discovery of the abscess, as in Cases 9 and 10. The operation also discloses the presence of sinus thrombosis, epidural abscess, and caries of bone adjacent to the dura, when present, indicating thereby the course of the infection (Nos. 5, 7, and 8). The dura, when exposed, usually bulges, but does not pulsate. In the beginning of the development of brain abscess, or in the event of a small abscess, the symptoms are ill-defined or may be wanting entirely, making a diagnosis impossible, unless the cavity is found accidentally during the mastoid operation. In children, the symptoms are especially obscure. The inflammatory or irritative symptoms, as fever and vomiting, may be present, but these can not be considered characteristic, unless accompanied by other more suggestive symptoms. In the terminal stage, the diagnosis can usually be made, though, unfortunately, it is then too late to be of value. In addition to the inflammatory symptoms of this stage, coma comes on suddenly with a rapid rise in temperature and is soon followed by death. The development of local symptoms makes the diagnosis easier as well as the being an aid in determining the location of the abscess. Aphasia, with or without associated disturbance of the opposite side, would indicate the location of the trouble in the left temporal lobe, while crossed paralysis of the extremities would indicate involvement of the motor areas in the temporal lobe, and paralysis of the parts supplied by the cranial nerves would

indicate pressure at the base of the brain. Local symptoms are so infrequent when the abscess is situated in the cerebellum, that in cases of primary disease in the posterior part of the mastoid or in the labyrinth, with symptoms of abscess, the absence of focal symptoms is by some considered a strong evidence that the seat of the abscess is in the cerebellum. However, the fact must be kept in mind that even in large abscesses of the temporal lobe focal symptoms may not arise (Nos. 6 and 8).

The differential diagnosis between brain abscess, especially of the cerebellum, and serous meningitis presents great difficulties owing to the similarity of symptoms. Although the history of otorrhoea would favor the presence of abscess, it can also be present coincident with serous meningitis, and a differential diagnosis is often impossible without making an exploratory puncture. It is equally difficult at times to differentiate between brain tumor and tubercular meningitis, with coexisting suppuration of the middle ear. Tubercular meningitis may run its course with elevation of temperature and with slow pulse. The diagnosis in these obscure cases can only be made by exclusion, and to accomplish this a resection of the mastoid bone becomes necessary. If the bone itself is found healthy and the disease limited to the antrum or the attic, the presence of brain abscess is not very probable. The nature of the meningeal exudate when present can be determined only by exploratory puncture and microscopic examination. If due to serous meningitis, the puncture is nearly always followed by marked improvement; not so, however, in tubercular inflammation.

To differentiate between brain abscess and tumor of the brain, with coexisting suppuration of the middle ear, which may simulate abscess, most importance must be attached to the duration of the development. In tumors of the brain, the symptoms develop much slower than in abscess, and they are, as a rule, accompanied by more pronounced optic neuritis (often pronounced choked disc), more frequent blindness, and by slow and progressive involvement of the cranial nerves.

D.—PROGNOSIS.

Unoperated cases of brain abscess always terminate fatally. Even in the event of the formation of a fistula, the drainage is insufficient, and death will result sooner or later, the result of a progressive encephalitis. Early operation with thorough cleansing of the cavity and careful drainage make the prognosis relatively favorable. In cured cases it is the rule for perfect mental and physical functions to be retained.

The direct method of searching for abscesses is also to be preferred when, on account of coma, chiselling is considered dangerous; also if a very large abscess is suspected, or if the abscess is believed to have its seat in the cerebellum.

After the dura has been exposed, its condition must be carefully studied. It should be noted whether or not it is injected, whether discolored or covered with granulations, and whether the sinus shows signs of thrombus formation. It should also be observed whether or not the dura is pulsating. This can be determined only when a rather large area of dura has been exposed. Pulsation of the dura does not necessarily exclude the possibility of an abscess, for pulsation may be present if the abscess be very small or deep-seated. On the other hand, pulsation may result from increased pressure from other causes, as hydrocephalus externus, hydrops of the ventricles, œdema, etc. It is a good rule whenever the dura appears healthy and symptoms suggestive of brain abscess are not marked—that is, if there are no local symptoms, no coma, and only the general symptoms of intracranial pressure, as slow pulse, headache, etc.—to await the result of the mastoid operation before incising the dura and exploring the brain. Experience teaches us that brain symptoms often accompany suppuration of the middle ear, especially in children, and that they disappear as soon as the disease in the ear is relieved. In considering the influence of the pulse on the question of operation, it is well to keep in mind the fact that some people, especially phlegmatic men, normally have a slow pulse, sometimes as low as 65, and that slow pulse is not positive evidence of intercranial pressure.

E.—TREATMENT.

The progress in the treatment of brain abscess in late years is due above all to the fact that operators do not now await the development of local symptoms but in doubtful cases rather make an exploratory puncture. The present method of treating abscesses surgically has also much to do with the success of these cases. In all but a few exceptional instances, the diseased portions of the mastoid bone are removed by performing a mastoidectomy, and the brain substance is explored through the exposed surfaces. The bone is partially or entirely resected according to circumstances. Partial resection is justifiable in cases where the middle-ear disease has previously run its course, where a fistulous opening is found leading to the abscess, or where the symptoms indicate trouble in the cerebellum. In all other cases, it is best to sacrifice the ossicles and to remove the posterior wall of the meatus in order to be able to thoroughly inspect the tegmen of the attic and antrum. If need be, the roof of the attic and of the antrum can eventually be removed and the dura exposed. During the resection of the mastoid, all granulations are carefully removed as far as they can be traced.

If the diseased ear is the only one with retained function, or if the function is much more acute than on the other side, the radical operation would hardly be justifiable as it is nearly always followed by deafness. In such cases, the direct exposure of the brain at some other point, with subsequent exploration of the brain substance, is the preferable method of procedure. As delay in evacuating a brain abscess may cost the life of a patient, a considerable area of dura should be exposed at the first operation so as to make a rapid exploration of the brain without an anæsthetic possible, should brain symptoms continue after the first operation. If this precaution had been taken in cases No. 3 and 4 of my series, the exploratory puncture of the brain would certainly have been undertaken much earlier, as pressure symptoms, especially the slow pulse, remained unchanged for some time after the first operation.

The method which I employ to explore the brain is to make a small incision in the dura with a pointed knife and lift the dura from the brain with a sharp hook to prevent injury of the vessels of the pia mater. The incision is then enlarged in a linear direction and a small incision made at right angles to the other, meeting it at its middle. Puncture of the brain through the unopened dura should never be practised, as pus, if present in the meninges, would be carried into the brain substance. There would also be danger of severing a large vein under the dura, causing a clot which might be overlooked. After making the incision into the brain substance, a pair of long thin forceps (a special pair devised by Péan is best) is introduced with the blades together, then opened and withdrawn with the blades apart. This enlarges the canal sufficiently for the thickest pus to be discharged. In this manner a methodical exploration is made in different directions. In the temporal lobe, puncture is first made straight upward, then backward, and then forward. Care must be exercised not to penetrate deeper than 4*cm* to avoid wounding the medulla or entering the lateral ventricles.

In exploring the anterior surface of the cerebellum at a point behind the antrum and sinus, the punctures should be made directly backwards, and backward and outward.

In cases of thrombus of the lateral sinus, it is good practice to remove the contents of the sinus, and after disinfecting with alcohol and 5 per cent. carbolic solution for five to ten minutes, to split the posterior or inner wall and make the exploratory brain puncture (Case 5).

To reach the posterior external part of the cerebellum for puncture, an opening is made in the occipital bone between the lateral and occipital sinus.

The various trocars (Macewen's searcher), syringes, and scalpels which have been used in exploring the brain for abscesses have, in my hands, been unsatisfactory and I have about discarded all of them. The operation of exploring the brain substance is not looked upon as a procedure of any consequence when carried out under antiseptic precautions, yet cases may occur where it results unfavorably.

This is especially true in cases where a number of futile efforts are made to find the abscess before it is located. If drainage is not good in such cases, secondary abscesses may develop along the line of one or several of the punctures. In my case No. 5, it would have been better had the temporal lobe been left unexplored. It is evident that the smallest number of punctures possible should be made in searching for pus in the brain substance, and this can best be accomplished by adhering to the routine method previously referred to. After the abscess has been found, drainage should be made as perfect as possible by splitting the wall of the abscess cavity as wide as possible. It is also permissible in cases of very large abscesses to make a counter opening and flush the cavity with warm antiseptic solutions. Macewen has suggested that instead of making a counter opening two drainage tubes be inserted, the smaller one to inject the fluid and the larger one to serve as the outlet. Case No. 8 was treated in this manner. Larger necrotic areas will have to be removed by opening and closing a pair of forceps in the wound. In small superficial cavities, adherent necrotic masses may be removed with a curette. Inspection of the abscess cavity with reflected light, to determine whether the surface of the cavity is smooth, is practically impossible, as the soft brain substance crowds into the opening. Palpation with the finger is also of little value, the soft tissue all making the impression of one pulpy mass.

After the abscess cavity has been cleansed as thoroughly as it will admit, a drainage tube wrapped in iodoform gauze should be inserted. It is important to have the end of the tube which is to be inserted into the abscess covered by gauze. In this way it acts as a sieve, allowing fluids to drain and the necrotic tissue to remain. This is removed at each dressing by introducing forceps as previously described. The tube should be introduced just far enough to allow the end to pass into the cavity. It is then sutured to the skin to prevent it from slipping in either direction, the wound powdered to prevent the bandage from adhering, covered by gauze, and bandaged.

Ordinarily the bandage may be allowed to remain three to four days before changing the dressing. At the dressing, the tube is removed and the cavity examined. This is repeated every three or four days, and usually after about twelve days the drainage tube can be left out. In cases where the pus is very abundant or offensive, the wound should be dressed every day and the tube allowed to remain three to four weeks (No. 8).

During the entire course of treatment, it is essential that the patient remain in the recumbent position. Macewen warns against allowing patients to leave their beds too early, having had a fatal case result in this way.

A PHONOGRAPHIC ACOUMETER.¹

By W. SOHIER BRYANT, M.D., NEW YORK.

(With five text-cuts.)

NO instrument or contrivance previously devised furnishes an adequate substitute for the human voice for testing hearing. It is impossible, however, to repeat a test made in the ordinary way with the human voice. Practice diminishes the variation which the voice has at different times, but never overcomes it entirely. It is still more impossible for an individual to even approximately repeat another's previous test of hearing for the human voice. The phonographic acoumeter alone gives an absolute and unvarying test of the hearing for the human voice, the lack of which has long been a stumbling-block in the path of the otologist. The tests with this acoumeter are susceptible of less variation or error in their application than with other methods. The results obtained by other methods are inexact, owing to indistinctness of articulation, imperfect closure of the other ear, changes in the position of the acoumeter and watch, the varying angle at which the tuning-fork is held, unequal force of the initial blow, etc.

The phonographic acoumeter invented by me overcomes all difficulties, for it can be manufactured in large numbers with perfect accuracy, and the pitch and intensity of its mechanical human voice do not vary. The voice produced by the machine has a constant intensity and pitch, the intensity being under accurate control of the operator, who can modulate it from the loudness of the voice when a speaking-tube is used, down to zero. In this way the machine allows the operator to determine accurately the limit at which the patient is able to hear sufficiently distinctly to repeat the words spoken by the machine.

¹ Demonstrated at meeting of American Otological Society, in Atlantic City, N. J., July 11th.

Distance is no longer needed for the voice tests. Even a patient with abnormally acute hearing can undergo satisfactorily all the voice tests in the smallest office. The sound-proof box prevents any of the sound reaching the patient, except through the tubes, which are under absolute control of the operator.

This acoumeter provides a sure method of detecting simulated deafness. When the malingerer feigns deafness in only one ear, the three-way valve, turning the sound on and off for the ears, rapidly alternating or simultaneously, distracts the patient, and prevents replies consistent with any considerable degree of real deafness.

The present methods of testing do not allow the determination of slight degrees of deafness, which is a very serious matter for the patient, as all otologists know that progressive deafness, if taken in time, offers more encouraging prognosis than when the hearing is already lost to a considerable degree.

This apparatus not only allows the recognition of the slightest diminution in hearing, but it also gives accurate tests of the quantity of hyperacusis, when it is present. It is the best means of giving a kind of massage which has been recommended of late, when, instead of regular pneumatic pulsations, sound vibrations are used; for this acoumeter furnishes the kind of passive motion to which the ear is normally most called upon to respond. The machine also gives the means of exercising the hearing power in the very deaf, which may help the hearing function, prevent its being wholly lost, prolong it, or even sometimes improve it.

The tests obtained by the use of this acoumeter can be directly compared in the same way that an ophthalmologist compares his visual tests with the assurance that the tests in every case are practically accurate.

Construction.—Fig. 1. An Edison standard phonograph' (*A*), fitted with a rubber tube (*a*), is placed in a sound-proof box (*B*) made of sheet lead. The tube (*a*) leads the sound out through the box wall. A brass graduating valve (*C*) is attached to the distal end of the rubber tube (*a*). This valve serves to regulate

¹ The Standard Phonograph Company, Orange, N. J., U. S. A., makers.

the volume of sound conveyed to the ears of the patient. The graduating valve has a central inlet (*b*) and a side outlet (*c*).

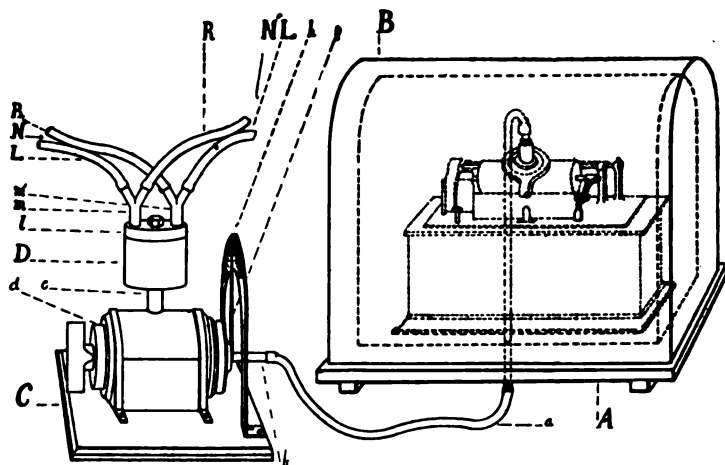
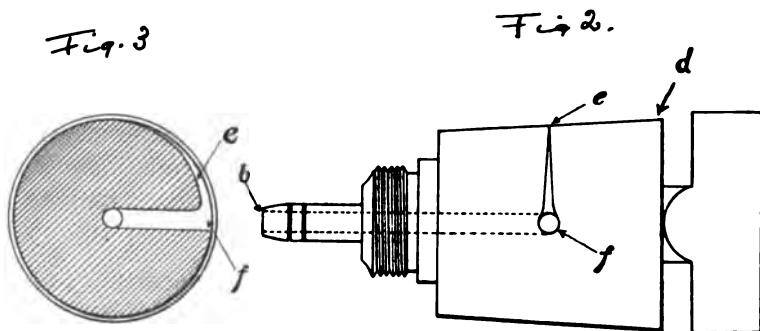


FIG. 1.

The plug (*d*) of the valve (*C*) (see Fig. 2) has a groove (*e*) on its surface leading from the side of the plug outlet hole (*f*). The groove (*e*) is made like the section of a bent cone with its base at the hole (*f*) and its axis extending for 90° over the surface of the plug (*d*). Fig. 3 shows the plug (*d*) in section through the tapering cone (*e*) and the outlet (*f*). The tapering



cone (*e*) serves to gradually close the passage of the sound through the graduating valve (*C*). This valve (*C*, Fig. 1) is fitted with an indicator needle (*g*) and dial (*A*). The needle

is attached to the rotating plug (*d'*). The dial is an arc of 100° . The reading on the dial indicated by the needle gives the proportionate amount of sound reaching the patient's ears — 0° when all the sound reaches the patient, and 100° when

Fig. 4

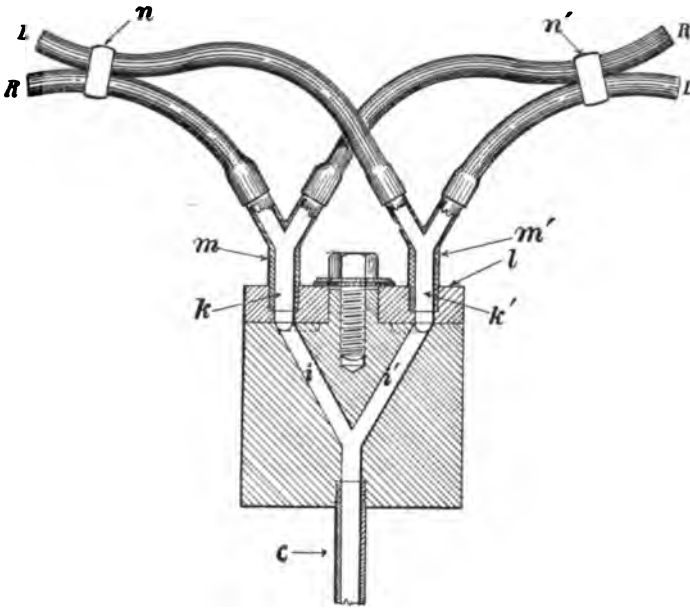
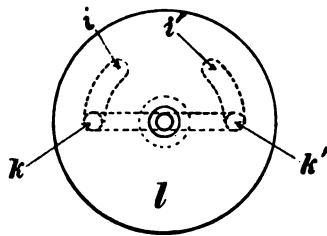


Fig. 5.



no sound goes to the patient. After leaving the graduating valve, the sound is conveyed to a three-way brass valve, called the malingerer's valve (Fig. 1, *D* ; Fig. 4), which has one inlet (*c*) and two outlets (*i* and *i'*), cut in such a way that rotation of

the disc (I) will open or close the outlets singly, alternately, or simultaneously. The outlets (i and i') correspond to the passages (k and k') in the disc (I), which are fitted with Y tubes. The two arms of the Y-tube (m) are each fitted with a rubber tube; one of the tubes goes to the limb of a stethoscope intended for the patient's right ear, and the other tube, in a similar way, to the limb of the stethoscope for the right ear of the operator. The other Y tube (m') is rigged in the same way for the left ears. The tubes for the patient are (n), and the tubes for the operator are (n'), both rights and lefts (R and L). Fig. 5 shows the disc (I) of the malingerer's valve (D). (k and k') are the passages through the disc (I) which correspond with the elongated openings of the forks of the inlet (c). The shape of (i and i') allows the alternate opening and closing of the sound passages.

The cylinders used in the phonograph are made from permanent master records. They can be readily replaced when worn out. The records are made from carefully selected monosyllabic words in common use, with special reference to the logographic value of their consonants.

The operator is provided with a slip of paper, on which the words of the record are printed, to enable him to check the words as the patient repeats them after the phonograph.

Mode of Operation.—The patient is instructed to repeat all he hears, and his ear tubes are adjusted in his ears, the operator taking his own tube. The indicator is placed at 100° on the dial, and the phonograph is started. The operator slowly moves the indicator until the patient remarks that he hears but does not understand, or repeats the words incorrectly. Then the operator, still moving the indicator, checks the words which the patient repeats correctly on the word list previously provided. When the patient repeats at least 75 % of the words correctly, out of ten or fifteen words, the scale is read and the test is completed. The reading of the scale gives the acuteness of hearing possessed by the patient. To get the absolute hearing, this number should be squared and multiplied by the percentage of words accurately repeated. A quick way of writing it is in the form of a fraction, the numerator being the reading of the scale, and the denominator the percentage of words repeated. The ears are tested separately

by adjusting the three-way valve for the separate ears. Normal hearing for adults ranges between 70° and 80° . Hyperacusis ranges above 80° .

In order to test unilateral malingerer, the indicator is placed at a point at which the patient hears readily by both ears together, and the operator quickly changes the three-way valve with his left hand, cutting off one or the other of the ears, but never both at once. At the same time he marks the words repeated correctly by the patient, with R for the right ear, and L for the left ear, and B for both ears, *or* similar symbols. The result will show conclusively, first, that the patient can hear, and second, that hearing of the two ears bears a constant proportion one to the other. If the patient suspect some trick, the relative proportion will be irregular, for no patient can be quick enough to detect accurately every change in direction of the sound. The hearing for the good ear alone must equal in accuracy the hearing for both ears together, if the bad ear is deficient to any considerable degree.

It will be noticed that in a rapidly repeated test the hearing of the patient, especially in cases of adhesive processes in the middle ear, decreases very noticeably, while a rest will usually restore it.

Should the patient become sufficiently familiar with the words on the cylinder to be able to supplement the defects in his hearing by his memory, an incident not likely to occur, unless the operator has allowed the patient to hear much more of the cylinder than the hearing tests required, a new cylinder can be substituted for the old one in a few seconds. This second cylinder is possible, because the skill of the experts of the Edison Company has reached such a point that, out of a few different records, two can be easily selected having practically the same pitch and intensity.

SUMMARY.

The Phonographic Acoumeter gives accuracy in hearing tests not hitherto attained.

It furnishes a universal standard, whose records are always comparable.

REPORT ON THE PROGRESS IN OTOTOLOGY DURING THE THIRD QUARTER OF THE YEAR 1903.

BY DR. ARTHUR HARTMANN.

Translated by Dr. ARNOLD KNAPP.

MIDDLE EAR.

(Concluded from page 361.)

d.—OTHER MIDDLE-EAR DISEASES.

323. Stern. Immobility of the stapes in the oval window. *Inaug. Diss.* Freiburg i. Br. Univ. Ohrenklinik zur Freiburg i. Br. Wiesbaden, 1903. J. F. Bergmann.

324. Roure. The clinical study of the diagnosis and treatment of the chronic middle-ear catarrhs, called "dry," of naso-pharyngeal origin. *Ann. des mal. de l'oreille, du larynx*, 1903, No. 2.

325. Stenger. On the etiology and treatment of sclerosis of the middle ear. *Deutsche med. Wochenschr.*, No. 29, 1903.

326. Shepard. A few remarks on some every-day ear cases. *Brooklyn Med. Jour.*, July, 1903.

323. After an historical introduction, the pathology of stapes ankylosis is fully described, including the various histological descriptions of stapes ankylosis which have been heretofore published (Katz, Bezold-Scheibe, Politzer, E. Hartmann, Siebenmann). The etiology and symptomatology are then described. In the chapter on hearing, seven cases are grouped which had been examined during life, and autopsy revealed ankylosis of the stapes. Gelle's test is carefully discussed. Its value is shown by a number of case-histories. The paper is written with extreme industry and unusual lucidity, and should demand the interest of all otologists.

BRUEHL.

324. ROURE distinguishes the changes of middle-ear catarrh as occurring in three stages : the hyperplastic form, the dry, and the atrophic. The diagnostic features of each one of these stages is described. The author is unusually optimistic about the results of passing the bougie in the Eustachian tube, the electrical air-pump irrigations and painting of the naso-pharynx, and general dietetic rules. ZIMMERMANN.

325. The author believes that sclerosis of the tympanic mucous membrane in most of the cases is an inflammatory process which extends from the nose and its adnexa through the Eustachian tube. NOLTENIUS.

326. The author analyzes one thousand cases, giving 1581 diagnoses; of these, 658 concern the middle ear; of these, 134 were chronic catarrhal otitis media. The internal ear alone was involved 57 times, and in 177 there was mixed middle- and internal-ear disease. Forty was the age of the greatest number of patients. The author concludes that the strain of active life accounts for this.

He suggests early treatment for all nasal and pharyngeal affections, which may later cause deafness.

The absence of telephone-operating from the list of occupations of the patients is noteworthy. BRYANT.

THE NERVOUS APPARATUS.

327. Alexander. On the pathological significance of endolymphatic hemorrhage in the labyrinth. *A. f. O.*, vol lix., p. 13.

328. Bloch. On galvano-therapy of Ménière's symptom-complex. *Prager med. Wochenschr.*, 1903, No. 20.

329. Alt. On disease of the auditory nerve after excessive indulgence in alcohol and nicotine. *M. f. O.*, 1903, No. 4.

330. Fragstein. On bilateral disturbance of hearing combined with bilateral facial convulsions, with remarks upon the distribution of the latter. *Wiener klin. Wochenschr.*, No. 38, 1903.

331. Pick. On the functional inhibition of the acoustic speech centre in the left temporal lobe. *Wiener klin. Wochenschr.*, No. 38, 1903.

327. ALEXANDER has investigated this question on 110 labyrinths of adult animals and 86 embryos. The animals were all killed with chloroform. The endolymphatic hemorrhage, according to the author, is the result of suffocation—just as the frequent perilymphatic hemorrhage of the labyrinth and hemorrhage in the tympanum. The view of Kirchner, who has re-

garded the endolymphatic hemorrhages as the result of the action of quinine or salicylic acid in his experiments, is untenable. Wittmaack's investigations have shown changes in the ganglion of the auditory nerve in animals poisoned with quinine.

HAENEL.

328. The author recommends galvanization directly through the skull in treatment of the Ménière symptom-complex. This method was regularly applied in two cases, with complete recovery; in two others a marked improvement took place.

PIFFL.

329. An author's abstract of this paper has appeared in a preceding number of these ARCHIVES, in the report on the 73d Congress of German Scientists and Physicians in Carlsbad.

330. A patient, fifty-nine years of age, was taken ill two years ago and suffered from increasing deafness, vertigo, and spasmodic contractions in the distribution of the facial nerve. The symptoms are supposed to be due to an aneurysmal condition in the base of the skull, probably of the posterior cerebellar artery. It is noticeable that the secretion of the lachrymal gland and the elevator of the soft palate were influenced by the disease of the facial nerve.

WANNER.

331. Report of a patient, sixty-five years of age, with pronounced paraphasia, with absent word-deafness, disturbance of writing, with partially preserved ability to read; amnesic aphasia, closely allied to optical aphasia, was present. Diagnosis of the lesion of the left temporal lobe, with absent or slight involvement of the first temporal convolution, was confirmed at autopsy. A carcinoma of the bronchus, with numerous metastases in all parts of the brain, was found. One of the nodules made a deep impression over the left temporal lobe.

PIFFL.

NOSE AND NASO-PHARYNX.

a.—GENERAL.

332. **Porcher.** Facial neuralgia; six cases due to diseases in the nose and antrum. *The Laryngoscope*, August, 1903.

333. **Kikuchi.** On the histology of bone cysts in the nose, with remarks on their development and origin. *Arch. f. Laryngol.*, vol. xiv., p. 308.

334. **Bresgen.** The glandular hypertrophies in the upper pharyngeal cavity and the permanent swelling of the nasal mucous membrane in their relation to each other and to the mental development of the child. *Die Gesundheitswarte des Kindes*, i., 1903, No. 9.

335. **Citelli.** On regeneration of the nasal mucous membrane in man. *Arch. f. Laryngol.*, vol. xiv., p. 350.

336. **Trautmann.** Relation of the nose and the genital organs. *M. f. O.*, 1903, No. 4.

332. **PEYRE PORCHER** claims that facial neuralgia is frequently due to disease of the nose and of Highmore's antrum. In Case 1, the neuralgia was caused by pressure of the hypertrophied turbinates; in Case 2, by inflammation of the antrum. In Case 3, the septum was crushed, pressing upon the turbinates, with complete occlusion of that nostril and inflammation of the antrum. In Case 4, severe and aggravated neuralgia had persisted after removal of the Gasserian ganglion, but disappeared after correction of septal deformity and removal of pus from the antrum. In Case 5, the septum was crushed and the antrum engorged. In Case 6, the septum was corrected and the antrum opened after preliminary removal of the Gasserian ganglion.

M. TOEPLITZ.

333. Fifteen bone cysts were examined, of which four were derived from cadavers and eleven from living persons, and one from an embryo, four months of age. The author concludes as follows: (1) The bony cyst occurs in the cartilaginous period of the foetal turbinates. This case points to the fourth month, and it can be regarded as an aberrant ethmoid cell, situated in the middle turbinate. (2) The condition of the internal mucous membrane of the bone cyst is identical with that lining the ethmoid cells. Their mucous glands are located about the opening of the cyst. (3) The dilatation and thinning of the bony wall of the cyst are the result of a resorption following an inflammation which is running its course.

ZARNIKO.

334. This is a popular paper on the important relation of nasal occlusion with the mental condition of especially neurasthenic children. The author does not remove the entire pharyngeal tonsil. He has, nevertheless, not observed any relapses, because he always follows the operation with appropriate treatment of the nose. If the nasal swelling be not attended to, a relapse is liable to occur.

BRUEHL.

335. The patient's lower turbinates required operation. Small fragments were cut away, and then, after 2-60 days, larger fragments, which included the previous wound, were removed and examined microscopically; wound healing could thus be examined, step by step. After describing the various features, the

author states that after removal of the superficial parts of the nasal mucous membrane, by which the deeper layers are enlarged, the anatomical condition of the mucous membrane shows only slight changes as a result of the proliferation process which takes place after operation. The glands and the cavernous bodies remain; in place of the loose tissue the superficial layers of the connective tissue appear. The bone is not changed. The scar presented a retraction at the surface, which is of good influence. The entire removal of the turbinate is unnecessary and to be rejected. ZARNIKO.

336. The author has endeavored to solve the hitherto unexplained relationship between the nose and the genital sphere on an anatomical and physiological basis. He gives a drawing of the nerve paths which serve to connect the two regions. In the remarks which follow, the author, in addition to the so-called genital areas as described by Fliess, states that others must be present in the nose, as every other mucous membrane, and even the external skin, possesses analogous areas which may form a reflex arch with the sexual sphere. PIFFL.

b.—METHODS OF EXAMINATION AND TREATMENT.

337. **Onodi.** An olfactometer. *Arch. f. Laryngol.*, vol. xiv., p. 185.

338. **Hirschmann.** On endoscopy of the nose and of its accessory cavities: a new method of examination. *Arch. f. Laryngol.*, vol. xiv., p. 195.

339. **Hurd and Holden.** A case of paraffin injection into the nose, followed immediately by blindness from embolism of the central artery of the retina. *Med. Record*, July 11, 1903.

340. **Stein.** On the use of hard or soft paraffin for subcutaneous injections. *Deutsch. med. Wochenschr.*, No. 37, 1903.

341. **Boye.** On intranasal vaporization. *M. f. O.*, 1903, No. 6.

342. **Delsaux.** Preliminary note on the treatment of lupus of the upper respiratory passages with radium. *La presse oto-laryngologique*, vol. 1903, Part 18.

337. This consists of a glass tube with a smaller nasal end and a lateral diverticulum, which contains a cotton plug soaked in the fluid. ZARNIKO.

338. The description of an apparatus constructed on the principle of Nitze's cystoscope. This has been used with advantage in endoscopy of the maxillary cavity of the ethmoid cells and of the naso-pharynx. The paper is illustrated by six colored pictures. ZARNIKO.

339. The patient, aged thirty-four, was injected three times with paraffin for a saddle-shaped nose: first, into the depressed parts below the nasal bones; secondly, after six weeks, about an inch from the tip on the right side; both injections without untoward results; thirdly, more than five months later, near the site of the second injection. The needle was at first introduced at the tip, pushed upward, and then, at the root of the nose, pushed down to a spot just about the former injection. The patient was now seen to rub his eye; he complained that he could not see with it. A little later, ecchymoses appeared about the tip of the nose, indicating that a vein had been punctured. Twenty-five minutes later, HOLDEN examined: Pupil of the right eye large, not responding to light. Subjective sensation of objects swimming about in the entire field of vision, but objectively unable to distinguish between light and dark. Media and retina clear; retinal veins normal. The main inferior branch of the central artery of the retina and its divisions were empty and collapsed. The main superior branch contained some blood, but upon gentle pressure on the eyeball the blood column broke up and the blood flowed backward into the central artery. Two hours after the first inspection, the white disk had become slightly blurred at its margins, and the retina about the larger vessels was hazy. Repeated massage had forced the blood out of both arteries and veins, so that the retina was entirely bloodless. Three hours later, the blood had returned to the veins and the superior artery was partly filled, but pressure at once emptied all vessels near the disk, while in the periphery thin blood columns persisted, although in many vessels they were broken. The retina was now oedematous, and the usual red spot near the macula well marked. No improvement in vision took place later on. The plugging of the retinal arteries is chiefly due to endarteritis obliterans. A good review of the literature concludes the paper.

M. TOEPLITZ

340. This paper is principally directed against Eckstein, who employs paraffin which melts at about 60 degrees. The author, from observation of patients and experiments on animals, comes to the following results: The danger of pulmonary embolus is practically to be excluded if the method is properly applied; if, however, it be conceded, it will surely be greater with hard paraffin than with soft paraffin. The technique in that case is very much more difficult, and the danger of burning the tissues

and necrosis of the skin, in consequence of the extreme distension from the injected hard paraffin, is present. If too much of the soft paraffin has been injected, a certain part of it can still be squeezed out of the point of injection after some hours. Though this in course of time is not absorbed, connective tissue grows through it, and thus forms an ideal substitute for the lost tissue. Hard paraffin, on the other hand, encapsulates and always remains a foreign body at the site of injection. Paraffin injections are especially serviceable to correct small and superficial deformities. Only small quantities are to be injected; if large quantities are necessary, other methods should be used. Stein's mixture consists of vaseline and paraffin, melting at a high point. It has a boiling point of about 41° C. It must be sterilized before being used, put in a water bath, and injected not in a fluid but in a pasty condition. NOLTENIUS.

341. The author has treated a number of cases of ozæna and chronic atrophic rhinitis, with and without an involvement of the accessory cavities, and a patient with hypertrophic rhinitis and suppurative of the antrum of Highmore with the intranasal vaporization of Berthold. The result in the first-named diseases was relatively favorable; the accessory-sinus affections were not influenced. The number of empyemata thus treated are too few to give an opinion on the value of the method.

PIFFL.

342. This is a preliminary communication on the attempts to treat lupus with radium rays. Some pure radium, in a small glass bulb, is attached to the laryngeal mirror. To treat the nose and the pharynx, a glass ball was fastened to a straight probe. After nineteen applications of it, each lasting forty-five seconds, the result is supposed to be satisfactory and the author is convinced of the curative value of the new measure.

BRANDT.

C—OZÆNA.

343. Rethi. The electrolytical treatment of ozæna. *Klinisch therapeutische Wochenschrift*, No. 27, 1903.

344. Somers. The effect of erysipelas upon atrophic rhinitis, with report of case. *Med. News*, August 29, 1903.

345. Braeckaert. Paraffin injections in the treatment of ozæna. *La presse oto-laryngologique*, vol. 1903, part 6.

346. Alexander. The relationship of ozæna to pulmonary tuberculosis, with remarks on the diagnosis of ozæna. *Arch. f. Laryngol.*, vol. xiv., S. 1.

343. According to the author, diagnosis of ozæna can be made from the specific odor. After one or two applications of electrolysis the fœtor has been diminished in one hundred cases, and in cases which were not too old it has been entirely relieved. In the electrolysis the electrode was forced into the middle turbinate, the negative was placed in the anterior part of the septum in the same side, and a corrosion from 5 to 10 M. A. was allowed to take from five to ten minutes. If the odor returns after a few months, renewed electrolysis is indicated.

WANNER.

344. A male, aged thirty-eight years, had since his tenth year an intensely fœtid odor, and blocking the nose with large greenish crusts, after removal of which the turbinates were found atrophic. After a slight blow over the right eye erysipelas developed, involving the entire face and neck and the nasal and pharyngeal mucous membrane with abscesses in the upper and lower lids, and suppuration of the lateral cervical glands. After the erysipelas had run its course, it was found that the ozæna and the crusts had entirely disappeared. While, later on, the nasal mucous membrane remained somewhat atrophic in patches, it was normal in the upper pharynx.

M. TOEPLITZ.

345. The author injects a paraffin which has become fluid at 45° C., underneath the mucous membrane of the turbinate. He considers this temperature to be the most advantageous, because paraffin becomes hard very slowly, and on account of the low temperature the danger of phlebitis is lessened. The method is explained and two case-histories are described. The histological condition of the mucous membrane before and after the paraffin injections is described and the curative effect of the procedure is warmly praised.

BRANDT.

346. The author emphasizes his standpoint as to the ozæna question, which he regards in the sense of Fränkel—as an atrophic process following hypertrophic catarrh of the nasal mucous membrane, in which a non-specific fœtor develops through bacterial disintegration of the discharge. The ozæna may be associated with localized suppurations; generally it is not. Neither the pathological nor the bacteriological conditions give positive diagnostic features.

Two hundred phthisis patients were examined, and in only one was the typical ozæna present. Six cases presented presumably healed ozæna, 9 showed marked atrophy without ozæna, 5

moderate atrophy without cause, and in 11 the atrophy was caused by marasmus and disturbance of nutrition.

In 50 patients who applied to the dispensary on account of ozæna, pulmonary phthisis was present in 22; 7 were suspicious, 4 had other pulmonary diseases, and 17 had healthy lungs. In other words, in ozæna we have a disposition to pulmonary tuberculosis. This is, according to the author, due to the imperfect function of the ozæna-nose as a filter for air germs, as a heater and moistener of the respiratory air; also the fact that the air germs find a suitable nidus in ozæna discharge. In the discharge of 7 cases of ozæna, so-called "acid-fast" bacilli were found which resembled the tubercle bacillus. If these bacilli should get into the sputum, they might lead to an erroneous diagnosis of tuberculosis.

ZARNIKO.

d—TUMORS OF THE NOSE.

347. **Royet.** Mental disturbance due to the unsuspected presence of mucous polyps in the nose. *Le progrès médical*, 1903, No. 33.

348. **de Ponthière.** A case of distension of the nasal bones by enormous and numerous fibromyxomas of the nasal cavities. *Ann. des mal. de l'or., du lar.*, 1903, 3.

349. **Brown.** Cases of sarcoma of the nose. *The Laryngoscope*, August, 1903.

350. **Clark.** Nasal polypi: A study of one hundred and forty-seven cases. *Boston Med. and Surg. Journal*, July 2, 1903.

347. A man thirty-eight years of age had been for three years in a constant state of anxiety, with auditory hallucinations, mental and bodily depression, with even suicidal thoughts. Immediate recovery on removal of the nasal polypi, which were, however, localized to the middle meatuses and had produced no symptoms.

OPPIKOFEK.

348. A complete myxomatous degeneration of both upper turbinates which had existed for years and had caused the nasal bones to be widely separated from one another—a distance of 5½ cm. The patient was forty-five years of age.

ZIMMERMANN.

349. In Cases 1 and 2 the tumor never recurred; in the latter it sprang from the perpendicular plate of the ethmoid. In Case 3, a man æt. twenty-one, the tumor completely filled the left nasal cavity, pushing the septum over to the right and distending the nostril; it flattened that side and produced a partial frog

face. It filled posteriorly the post-nasal cavity and pressed the soft palate downward. The tumor was sessile; it had grown from the inferior and middle turbinates and the posterior part of the vault above, was further attached to the upper part of the left palatæ bone, body of the sphenoid, posterior end of vomer. The inferior and middle turbinates and a portion of the body of the sphenoid were almost entirely rarefied. BROWN first removed twelve pieces of the tumor by means of snare and scissors and operated upon it also forty-nine times with the electro-cautery, thus removing the greater portion of the tumor, except a large piece attached to the vault of the naso-pharynx and the posterior end of the septum, which was removed under chloroform with the screw snare. After this, twenty-five other electro-cautery operations were performed upon parts of the tumor not entirely removed—chiefly in the turbinal region. Complete recovery took place with restoration of smell and excellent cosmetic result.

M. TOEPLITZ.

350. Of 146 cases, 107 were in both nostrils, 19 in the left and 20 in the right only; 76 in males and 70 in females; more than half of the cases, 78, between the thirtieth and fiftieth year of age, 20 between twenty and thirty, and 29 between fifty and sixty, 1 at thirteen, and 1 at seventy-eight. In 37 cases a deformity of the septum was found, which might have indirectly brought them on. Of 49 cases with suppuration from an accessory sinus, 1 from the maxillary antrum only, 11 from the ethmoidal only, 11 from the ethmoidal and the antrum, and 29 probably originated from the ethmoidal. A fifth of the cases were due to local vasomotor disturbance. The symptomatology, sequelæ, treatment, and prognosis are also considered.

M. TOEPLITZ.

c.—DISEASES OF THE ACCESSORY SINUSES.

351. **Gilbert.** Mucocoele of the anterior ethmoid cells. *Ann. des mal. de l'or., du lar.*, 1903, 3.

352. **Yankauer.** An unusual symptom of empyema of the antrum of Highmore. *Med. Record*, Aug. 15, 1903.

353. **Krebs.** Paralysis of the trochlearis nerve in suppurations of the maxillary antrum. *Therap. Monatshefte*, Sept., 1903.

354. **Onodi.** Opening of the maxillary antrum from the middle meatus. *Arch. f. Laryngol.*, vol. xiv., p. 154.

355. **Weinberger.** On transmitted tuberculosis of the antrum of Highmore. *Arch. f. Ohrenheilk.*, 1903, part 4.

356. **Luc.** My last improvements in the treatment of chronic sinus disease of the face. *La presse oto-laryngologique*, vol. 1903, part 5.

357. Onodi. On cavities in the frontal bone. *Arch. f. Laryngol.*, vol. xiv., p. 375.

358. Hansen and Pluder. A case of real duplication of the frontal sinus. *Arch. f. Laryngol.*, vol. xiv., p. 404.

359. Eschweiler. The radical operation for frontal empyema, after Killian. *Sitzungsber. d. Niederrhein. Gesellsch. f. Natur- u. Heilkunde*, July 13, 1903.

360. Blondiau. Curious course of a revolver bullet—penetration of the bullet into the cranial cavity across the frontal sinus. *Arch. internat. d'otol.*, etc., 1903, p. 937.

361. Onodi. The relation of the optic nerve to the sphenoid cavity, and especially to the most posterior ethmoid cells. *Arch. f. Laryngol.*, vol. xiv., p. 360.

351. A small tumor as large as a nut was taken for a tumor of the lachrymal sac on account of the symptom of epiphora and its situation at the inner angle of the eyelids. The operation shows that a mucocele existed of an isolated ethmoid cell, which was closed towards the nose. Recovery after primary suture.

ZIMMERMANN.

352. A man, æt. forty-eight, with both lower turbinates swollen, showed, after cocainization, a large growth in the left nasal side under the middle turbinate. It extended $2\frac{1}{2}$ cm over the middle turbinate, across from the lateral wall in the shape of a polypus, and was covered with smooth mucous membrane and large dilated veins. There was pus on the nasal floor, and on incision two drachms of pus escaped. The tumor then collapsed completely. There existed either a congenital absence of the bony wall or a necrosis thereof,—a very rare condition.

M. TOEPLITZ.

353. Immediate appearance of the ocular lesion (interference of motility downwards, diplopia) after the onset of the suppuration of the antrum of Highmore. The ocular symptoms disappeared after opening the cavity; the paralysis was cured on cessation of the discharge from the antrum.

BRUEHL.

354. Siebenmann, as is well known, proposes to break through the middle meatus into the maxillary antrum with the small finger, and thus produce a large opening. ONODI, instead of the small finger, uses the dilating trochlea, with which he can easily make an opening 2 cm broad into the middle meatus, through which the cavity can be easily cleansed and tamponed.

ZARNIKO.

355. WEINBERGER describes a case of tuberculous disease of both superior maxillary antrums from extension of a tuberculosis of the buccal cavity, especially of the superior maxillary after perforation of the bone in the canine fossa. The mucous membrane of the maxillary sinus contained microscopically visible giant cells, caseation, and epithelioid cells. Tubercle bacilli were not discovered.

PIFFL.

356. These are the latest experiences in the chapter on Nasal Pathology which LUC presented at Washington in the Congress of the American Laryngological Society:

1. Maxillary sinus: Surgical treatment should be limited to cases of chronic suppuration. Purulent sinusitis should be distinguished when it is produced and kept up by inflammation of the degenerating mucous membrane from empyema of the Highmore antrum resulting from caries of the teeth, or from a transmitted inflammation of the frontal sinus in which the mucous membrane remains healthy for a long time. If in the last case the source of infection has been removed, simple irrigation of the antrum of Highmore suffices for a cure. A radical operation is undertaken only after repeated puncture of the maxillary antrum from the lower meatus and repeated irrigations. The radical operation consists in the making of two large bony defects—one in the anterior wall, which is later closed; the other, in the inner or nasal wall, which preserves a broad communication with the nasal cavity. The latter demands the removal of a large part of the middle and inferior turbinates. The results are unexpectedly good.

2. Frontal sinus: Killian's method is warmly recommended in cases of abnormally large sinuses and where the ethmoid cells are involved. In a small sinus, and where the ethmoid cells were healthy, the author has obtained satisfactory results with the Ogston-Luc method.

3. Ethmoid cells: A new method for eradicating the ethmoid cells is described with the aid of a peculiarly constructed forceps with broad and horizontally placed ends. The greater part of the middle turbinate, the fungous mucous membrane, or myxoma can be removed with facility. In the first sitting, as many as possible of the mucous polyps are removed with the cold snare. In the second sitting, after sufficient cocainization, with this forceps the posterior end of the middle turbinate is grasped and evulsed. The procedure is repeated three or four times before

the bleeding makes an interruption necessary. The entire middle turbinate is thus resected. Below it, fungous and myxomatous masses are found which are easily removed with the forceps. All ethmoid cells are opened, and then finally the anterior lower wall of the sphenoid cell is broken into, and recovery takes place after two to three sittings. Relapses are rare and easily treated as cavities, and angles are corrected.

4. The sphenoidal sinus can be exposed by the rhinoscopic path and on forming an artificial defect. The method selected depends upon the size of the nose and the associated disease of the maxillary sinus. If the antrum of Highmore is healthy, one can proceed rhinoscopically, as under 3. After removal of the ethmoid cells the sphenoid cell is easily accessible. The opening is made as large as possible. If the maxillary antrum is diseased, the sphenoid cavity can be opened up through it (Jansen, Luc, Foret), a method which can be practised in marked deflections of the nose even if the antrum of Highmore is healthy.

BRANDT.

357. A careful description of the condition of the frontal sinus in thirty skulls, illustrated with numerous photographs. The first variety described is interesting, where the anterior ethmoid vessels and the nerves of the same name are situated in a half channel in the bottom of the frontal sinus or in an orbital ethmoid cell. This favors an extension of inflammation of these cavities to the orbit and to the cranial cavity.

ZARNIKO.

358. In a cadaver the frontal sinus was found very large, excepting towards the squama, towards the zygomatic bone, and towards the orbit. The other was found just as large, but completely divided into two parts by a sagittal partition—both emptying side by side into the common nasal frontal duct.

ZARNIKO.

359. Report of three patients with chronic empyema of the frontal sinus, which were operated on with good success after the method of Killian. (Detachment of the trochlea facilitates operation.)

BRUEHL.

360. A revolver was shot off at a distance of 75cm from a man seventeen years of age. The point of entrance corresponds to the right frontal sinus. The X-ray picture showed that the bullet divided into two parts at the anterior and posterior walls of the sinus, then changing its course continued along the inner

side of the roof of the skull upwards, and remained at the top of the skull without causing symptoms or injuring the brain. The smallest piece of the bullet did not enter into the frontal sinus, but was found 2cm above the point of entrance, between the skin and the anterior wall of the sinus. The operation consisted in the removal of the bony fragments from the frontal sinus and the extraction of a small part of the bullet. Recovery, without reaction.

OPPIKOFEK.

361. Twenty cadavers were examined. In 6 cases, on both sides the most posterior ethmoid cell was situated in the small wing of the sphenoid, and in 10 cases it was present only on one side; in 5 cases the sphenoidal cavities extended into the small sphenoid wing.

In these 6 cases, where the most posterior ethmoid cells extended on both sides into the small sphenoid wing, an intimate connection existed between it and the optic nerve, as it formed the marginal wall of the optic cavity; also, in 2 cases, the lower wall, and in 2 other cases, the wall of the optic sulcus. In 3 half skulls the most posterior ethmoid cells formed the walls of the optic canal and of the optic foramen. The wall of the sphenoid is usually, at the level of the optic foramen, as thin as paper. The wall of the most posterior ethmoid cell is just as thin when it forms the wall of the optic canal. Sometimes there are differences between the two sides. This most interesting condition is illustrated with 9 photograph illustrations.

ZARNIKO.

f.—OTHER DISEASES OF THE NOSE.

362. Dunbar. On the etiology and specific treatment of autumn catarrh. *Berliner klin. Wochenschr.*, No. 28, 1903.

363. Immerwahr. On hay-fever and its treatment with Dunbar's pollen antitoxine. *Berliner klin. Wochenschr.*, No. 28, 1903.

364. Mayer. The cause and specific treatment of hay-fever; a preliminary report on the use of the toxines and antitoxines of Professor Dunbar. *N. Y. Med. Journ. and Phila. Med. Journ.*, Aug. 8, 1903.

365. Stowell. Hay-fever: A cause and a cure. *N. Y. Med. Journ. and Phila. Med. Journ.*, Sept. 5, 1903.

366. Baurowicz. The wandering of a foreign body. *Arch. f. Laryngol.*, vol. xiv., p. 187.

367. Helot. On primary nasal diphtheria. *Ann. des mal. de l'or., du lar.*, 1903, 1.

368. Wittmaack. The treatment of lupus of the nose with pyrogallie acid. *Munch. med. Wochenschr.*, 1903, No. 31.

369. Treitel. Syphilitic necrosis of the superior maxillary bone. *Arch. f. Laryngol.*, vol. xiv., p. 394.

370. Streit. On the occurrence of scleroma in Germany. *Arch. f. Laryngol.*, vol. xiv., p. 257.

371. Lichthorn. A case of rhino-scleroma. *Inaug.-Diss.*, Berlin, 1903.

362. The author has extended his well-known investigations on hay-fever to those of autumn catarrh, a peculiar form of hay-fever observed in North America. Hay-fever, according to the author, is due to the pollen toxine of various plants. This toxine is different from that causing ordinary hay-fever. Curiously, the antitoxine obtained from the pollen toxine of the Gramineæ neutralizes that obtained from the pollen toxine of the Solidago.

MUELLER.

363. Personal experiments lead the author to the following conclusions: Dunbar's pollen antitoxine is an excellent means to stop the beginnings of hay-fever, if one remains in close rooms, and especially if the weather in June to the time of the sprouting of the grass is cloudy and rainy. If, however, one is forced in June as in other times of the year to be much on the street, take long railway journeys, and go into the country, the pollen antitoxine in its present method of application is only a means to treat the unpleasant symptoms of hay-fever, which, however, is much more efficacious than any other medicament, but cannot be regarded as an infallible specific.

MUELLER.

364. Dunbar found the hay-fever poison as a soluble toxine in the starch bodies of the Gramineæ. By injecting the toxine prepared from the pollen of rye into animals, a serum was produced. MAYER dropped a mixture of equal parts of normal horse serum and of pollen toxine into one eye, and one drop of a mixture of equal parts of antitoxine and pollen toxine into the other eye. In the so-called spring catarrhs there occurred a reaction in the first eye, while the other remained normal; the reaction was relieved by the antitoxine. There was an absolute failure to react in the autumnal cases, and no reaction, except in one case, in the control cases. One drop of the serum is sufficient to neutralize the effect of twenty drops of the toxine. The toxine for the autumnal variety is yet to be found.

M. TOEPLITZ.

365. Hay-fever is a disease of the nervous system, irritated by the actinic rays of the sun, which are strongest at the hay-

fever season, setting up a reflex through the eye, the ciliary nerves through the lenticular ganglion being connected with the nasal ganglion, or by the connection of the Gasserian ganglion with other branches of the trifacial nerve. The treatment consists in the wearing of smoked glasses, and is particularly adapted to the early summer type.

M. TOEPLITZ.

366. After an attempt at suicide: The revolver bullet passed through the chin and into the upper jaw, and remained lodged in the region of the left frontal process. Purulent discharge of the nose and occlusion of the left half of the nose for four years. The bullet was detected imbedded in granulations in the middle meatus. Four weeks later, it had descended to the lowest part of the meatus and could be easily removed.

ZARNIKO.

367. Based on two cases of primary nasal diphtheria, one with severe general disturbances, and the other with an apparently mild cause, HÆLOT states that the diagnosis of diphtheria cannot depend upon the simple bacteriological examination; but if the forms which are morphologically similar to the diphtheria bacilli are to be found, experiments on doves should be made, and on the result of these should the diagnosis depend.

ZIMMERMANN.

368. Pyrogallic acid has a number of advantages over lactic acid, especially that the inflammatory reaction is less. After previous surgical treatment, gauze strips were impregnated with a 10 to 20 % ointment and packed on the diseased areas and left for one day. The treatment has frequently to be repeated after longer intervals.

SCHEIBE.

369. A piece of bone removed by the author consisted of the alveolar process, consisting of the canine and first premolar teeth, as well as the part of the canine fossa lying directly above. A portion, with the second incisor tooth, was also removed. Diagnosis: syphilis. Literature given.

ZARNIKO.

370. In this monograph, all of the cases of scleroma which have become known in Germany are given. These are divided into three groups: (a) Of the cases thus far published: (1) with certain diagnosis, 18; (2) with not an absolutely sure diagnosis, 4; (b) insufficiently published cases, 10; (c) cases published as scleroma, in which the diagnosis, however, cannot be confirmed. Excepting three cases, all the patients came from East Prussia

and Silesia, and chiefly from the country or the small cities. They were located about two infected areas. Unquestionably many cases of scleroma were overlooked, as their number in Germany is surely much greater than those of the reports. There is great danger that the infection will extend and that entire Germany will slowly be invaded. Hence energetic means are in order. These should consist as follows:

1. Scleroma should be reported.
2. With the aid of the general physicians, or with special committees, the infected areas should be carefully investigated.
3. Those suspected of scleroma should be in the charge of physicians, and if the diagnosis has been confirmed they should be isolated in special homes for scleroma patients.

ZARNIKO.

371. A case of rhino-scleroma is reported from Frankel's clinic. A man twenty-six years of age, from Warsaw; though the middle ear appears to have been also affected, an examination of the ears was not made.

BRUEHL.

g.—NASO-PHARYNX.

372. **Loewenberg.** On the association of deformities of the thorax with pharyngeal hypertrophies. *Deutsche mediz. Wochenschr.*, No. 29, 1903.

373. **Barth.** Hypertrophy of the pharyngeal tonsil in soldiers, and its relation to hypertrophic rhinitis and chronic pharyngitis. *Arch. f. Laryngol.*, vol. xiv., p. 82.

374. **Weil.** On the operation for adenoids. *M. f. O.*, 1903, No. 7.

375. **Pugnat.** Some complications of adenoid vegetations. *Revue médicale de la Suisse romande*, 1903, p. 611.

376. **Roepke.** A case of foreign body in the larynx and in the trachea. *Arch. f. Laryngol.*, vol. xiv., p. 189.

377. **Senator.** A case of spindle-cell sarcoma in the naso-pharynx of a child five years of age. *Deutsche med. Wochenschr.*, No. 27, 1903.

372. In order to preserve his priority, LOEWENBERG has translated a chapter from his book on adenoid tumors of the naso-pharynx, Paris, 1879, in which the changes in the thorax associated with adenoid vegetations are described. The author believes that the pectus carinatum, just as well as the depressed thorax, can be referred to the occluded nasal respiration from adenoids during the developmental period of the thorax, and that thus the lung and the thorax come into a condition of negative pressure and sink in when the diaphragm sinks during inspiration, in order

to sufficiently ventilate the lung. If the occlusion is not corrected, gradually a permanent, flat, depressed thorax results.

NOLTENIUS.

373. The author defines pharyngeal hypertrophies according to their size, in four groups. Of 561 recruits: Group I., 32 %; II., 36.8 %; III., 21.4 %; IV., 9.8 %.

Pharyngeal hypertrophy favors hypertrophic rhinitis, especially hypertrophy of the posterior ends of the turbinates. Hypertrophy of the palatal tonsils occurs very much more rarely than that of the pharyngeal tonsil (10 %); chronic pharyngitis in 30-40 %, dry pharyngitis in 2 % of the cases. In pronounced hypertrophy of the pharyngeal tonsil a well-marked vault of the palate was present.

ZARNIKO.

374. The author operates rarely under general anæsthesia as a rule, but under local cocaine anæsthesia, with Beckmann's knife. If parts remain suspended, these are removed with forceps and with snare. After-hemorrhages are corrected by digital examination with the finger. Remnants which remain after a number of weeks are removed with the snare through the nose under adrenalin cocaine anæsthesia.

PIFFL.

375. The author reminds the practising physician of the well-known fact that adenoid vegetations have not only an influence on the respiratory organs and on the ear, but also on the nervous system and on the digestive apparatus.

OPPIKOFEK.

376. In one of the four cases reported, the pharyngeal tonsil which had been cut away dropped into the larynx. The patient, who was eleven years old, was thereupon stood upon his head, the doctor gave him a good blow on the back, and the pharyngeal tonsil fell out.

ZARNIKO.

377. SENATOR describes a cauliflower-like tumor which was suspended from the naso-pharyngeal cavity into the pharynx of a boy five years of age. On the attempt to remove it with the Gottstein curette, the tumor broke into a number of pieces which had evidently been united by a common pedicle. The hemorrhage was unusually slight. A microscopical examination was made by Weigert. The tumor consisted principally of spindle-cells with a few round cells. The intracellular substance was very slight, so that the tumor would probably be regarded as a cellular fibrosarcoma.

NOLTENIUS.

SOFT PALATE, PHARYNGEAL AND BUCCAL CAVITIES.

378. **Bentzen.** On the etiology of the high palate. *Arch. f. Laryngol.*, vol. xiv., pp. 203-256.

379. **Strebel.** On the use of light in the treatment of chronic pharyngeal catarrhs and other pharyngeal processes. *Arch. f. Laryngol.*, vol. xiv., p. 99.

380. **Baumgarten.** Aneurism of the ascending pharyngeal artery. *M. f. O.*, 1903, No. 7.

381. **Glas.** On the pathology of tuberculosis of the palatal tonsil. *Wiener klin. Wochenschrift*, No. 36, 1903.

382. **Escomel.** The palatal tonsils and their contents in tuberculosis. *Revue de méd.*, 1903, p. 459.

383. **Theisen.** A case of lipoma of the tonsil. *The Laryngoscope*, August, 1903.

384. **Neufeld.** A case of deep-seated pharyngeal sarcoma. *Arch. f. Laryngol.*, vol. xiv., p. 182.

385. **Prokunin.** On the surgical treatment of malignant pharyngeal tumors. *Chirurgija*, vol. xiii., No. 76, April, 1903.

386. **Swain.** The lymphatic system and the tonsils. *Amer. Jour. Med. Science*, July, 1903.

387. **Fisher.** Report of two cases of ulcerative angina and stomatitis, associated with the fusiform bacillus and the spirillum of Vincent. *Amer. Jour. Med. Science*, Sept., 1903.

388. **Amberg.** Sublingual growths. *Amer. Jour. Med. Science*, Aug., 1903.

378. The views of the various authors on the etiology of the high palate are fully given, and the present difference of opinion as existing between Bloch and Koerner on one side and Siebenmann on the other. His own investigations consist of an examination of 394 individuals. There is no definite relationship between the height and the breadth of the normal palate. The absolute height increases up to the twenty-fifth year, especially after the appearance of puberty, then diminishes. The breadth increases steadily, chiefly in the period after the second dentition. Men have a broad, women a narrow and relatively high palate. The palate in leptoprosopia is high; in chamæprosopia, narrow after change of teeth. Before the change of teeth it is reversed. The V-shaped palate is not so rare in individuals who do not suffer from a septal deviation, nor in mouth-breathers. It is principally present in high palates. Adenoid vegetations occur in rachitic individuals with leptoprosopia twice as frequently as in chamæprosopia. Individuals with adenoid vegetations, and mouth-breathers, have a higher palate than nasal-breathres. Rachitis has no appreciable influence on the height of the

palate, if the condition is associated with mouth-breathing and adenoid vegetations. There is a causative relation between mouth-breathing and high palate. The V-form palate is more frequent with adenoids in mouth-breathing than in normal; it is more frequent in males than in females, more frequent in leptoprosopia than in chamæprosopia, more frequent in a high than in a low palate.

The septal deviation occurs principally in leptoprosopia. Adenoid vegetations appear to have no influence upon it.

ZARNIKO.

379. STREBEL has had very good results in chronic catarrhal processes by the action of cold light on the pharyngeal mucous membrane. The effective rays are those from ultraviolet to blue. The apparatus is described.

ZARNIKO.

In a woman, forty-two years of age, who consulted the dispensary on account of snoring, a tumor was found in the right lateral pharyngeal wall, which varied in size and pulsated, and, from its location, could only belong to the ascending pharyngeal artery. The patient had no knowledge of its presence, as she had never had any discomfort.

PIFFL.

381. After a review of the literature of the subject, two cases of primary tonsillar tuberculosis and one case of miliary tuberculosis are reported. In the first case, the tonsil presented the unquestionable picture of tonsillar hypertrophy. In the course of the disease a retropharyngeal abscess appeared. In the second case, besides the diseased tonsil, a diseased focus was found on the vocal cord of the same side. The tonsil contained numerous tubercle bacilli. In the third case, the upper air passages were completely studded with nodules and extensive tubercular ulcers.

The cause was either inhalation or infection with the sputum. The possibility of infection with the laryngeal mirror is always possible.

The treatment of primary tonsillar tuberculosis is a radical removal with the tonsillotome or galvano-cautery.

Microscopic examinations enable the author to distinguish the various forms of tonsillar tuberculosis: 1, miliary; 2, sclerotic; 3, chronic ulcerous; 4, chronic granulating form. WANNER.

382. ESCOMEL examined the tonsils of twenty-five individuals who had died of general tuberculosis, and in twenty-one, tubercle bacilli were found. There were no ulcerations, so that the

diagnosis could not be made with the naked eye, but only with the aid of a microscope. Bacilli may be found in every portion of the tonsil mass, frequently in the depths of the crypts. The bacilli were found in three cases in the blood-vessels. In addition to the tubercle bacilli, there are on the surface numerous cocci, bacilli, fungi, which injure the epithelium in the places they enter and then facilitate the entrance of the tubercle bacillus.

The tonsils of eleven adults who were free from tuberculosis and died from other causes were also examined. Microscopically, no tuberculous changes were found, though in two, in the depths of the crypts, tubercle bacilli were present. The uvula in twenty-five tubercular and eleven non-tubercular patients showed normal conditions.

OPPIKOFER.

383. A girl, aged eight years, had been troubled for three years with a severe cough. A tumor, of the size of a small marble, was attached to the centre of the right tonsil by a rather long, thin pedicle, which came out of a tonsillar crypt. It was round, smooth, and of yellowish color. Microscopically it was a lipoma. Besides THEISEN's case there are but six cases on record. These are given *in extenso* together with a complete review of the literature on lipoma of the nose and pharynx and the relative frequency of benign tumors of the tonsil.

M. TOEPLITZ.

384. A malignant pharyngeal tumor was suspected on account of a hard glandular swelling which appeared in the neck. Microscopic examination of one of these extirpated glands revealed sarcoma. Further course and autopsy revealed the diagnosis of deep-seated pharyngeal sarcoma.

ZARNIKO.

385. The paper treats of the malignant tumors of the oropharynx, and includes thirty-one cases of exclusively Russian surgeons', including three of the author's. The following conclusions are reached:

(1) The preceding tonsillotomy is unnecessary in the surgical treatment of malignant tumors of the pharynx and can be replaced by the lateral position of the patient with dependent head.

(2) The large vessels of the neck need not be first ligated, but the vessels which pass to the tumor can be ligated.

(3) In all cases of malignant disease of the oropharynx those parts of the neck must be exposed where the most frequently affected lymph glands are situated.

(4) There is no single operative method for all cases to be regarded as best. In general the incision must be so finished that

the operative field can be properly exposed and the tumor easily removed.

SACHER.

386. In a man, aged sixty-three years, the throat was gradually filling up without pain. Both faucial tonsils and the lingual were enormously enlarged. The swellings were very much reduced by arsenic, but returned to their former size when the treatment was interrupted, but finally remained large. In the hard palate a swelling appeared hanging down into the mouth with spots of pressure necrosis. The lymph nodes all over the body became enlarged. There was a swelling also in front of the left ear and one over the right mastoid. Death took place from exhaustion. This was a lymphadenoma; the first tissues affected were the tonsils as integral parts of the lymphatic system. In another case, a young man of twenty was suddenly stricken with acute Hodgkin's disease following a simple streptococcus tonsillitis. Death took place within six days. The function of the tonsils and the lymphatic ring are extensively discussed. Marked cases of acute inflammation of the pharyngeal tonsil are not so rare, and one case is cited *in extenso*, which took several months before the child recovered its former strength. It had no other symptoms than fever and swelling of lymph nodes in the neck at the angle of the jaw and farther down under the sterno-cleido-mastoid muscle. M. TOEPLITZ.

387. After a bacteriological description of the fusiform bacillus and the spirillum of Vincent, FISHER's Case 1 is given as occurring in a young man, aged twenty, whose gums, a week after extraction of the last molar tooth on the left side of the lower jaw, had become hyperæmic, the site covered with an irregular superficial ulcer, the floor of which was composed of a rusty-gray membranous exudate. This condition continued for three weeks, when the tonsil and uvula became ulcerated. The exudate was easily removed, but readily re-formed and bled. Upon mild antiseptics the lesions disappeared after three weeks. Case 2, a woman aged thirty-six years, suffered from acute maniacal insanity; she was constantly moistening her lips with her tongue, which came in contact with her partially closed teeth, causing an irritation and abrasions along the edges of the tongue. This was soon ulcerated and covered with creamy exudate, which also appeared along the border of the lower gums. The scraping contained the fusiform bacillus and the spirillum of Vincent. This was a gangrenous stomatitis. M. TOEPLITZ.

388. A seven-month-old boy had a tumor under the tongue, 1 to 1.5 *cm* in diameter and about 5 *mm* in thickness, which had the appearance of a disk, was rather hard with a somewhat rough surface. The oral surface was pearly-white surrounded by a reddish margin, the centre was slightly depressed and showed some sloughing. It was perfectly separated from the tongue and was attached to the frenulum with a broad base. It had persisted for about four weeks, starting as a hard, white pimple, when the first teeth, the two median lower incisors, first appeared. It was easily removed with scissors. The affection seems to occur most frequently in southern Italy. AMBERG's case occurred in a baby from parents of American descent and is the first on record in the United States. Progressive cachexia, frequently associated with these tumors, was not seen. The structure of the growth is a product of an inflammatory process. The etiology of the affection is obscure.

M. TOEPLITZ.

BOOK REVIEWS.

III.—**Bericht über die Leistungen in der Ohrenheilkunde.**

Von Dr. BLAU. Sechster Bericht, 1901-1902, pp. 283. Price, M. 4 (\$1.00). Published by S. Hirzel, Leipzig.

This, the sixth, report covers the years 1901 and 1902. The well-recognized ability of the author in just this kind of work makes it unnecessary to say anything further in praise of this little volume. The judicial selection of the material, the practical arrangement of the subject-matter, and the lucidity and brevity of the abstracts make these reports models of their kind. The book will prove of great interest and profit to every otologist.

A. K.

IV.—**Handbuch der Ohrenheilkunde.** Von Professor KIRCHNER. Seventh Edition, 1904, pp. 272. Published by S. Hirzel, Leipzig. Price, M. 5.80 (\$1.40).

In this new (7th) edition of the text-book by Professor Kirchner in Würzburg, to keep pace with recent advances in Otology, the following chapters have been re-written and enlarged: Functional examination, diseases of the naso-pharynx, operative treatment of acute and chronic suppurative processes, and deafmutism. The style is clear, the book is short, yet sufficiently exhaustive for students and general practitioners, to whom it can be recommended.

A. K.

V.—**Handatlas der Operationen am Schläfenbein.** Von Professor GERBER, Königsberg, with 10 plates and 9 illustrations in the text. Published by J. F. Bergmann, Wiesbaden, 1904.

This atlas is designed, as stated in the preface, primarily as an aid to the young aural surgeon in his practical exercises on the cadaver and in his first operations. Though the operations have been frequently well described, suitable illustrations have hitherto been wanting. The various steps in the following operations are

portrayed. The simple mastoid (Schwartz), the complete exposure of the middle-ear cavities (radical operation, Stacke-Zaufal-Schwartz), the operation for suppuration of the labyrinth, for extradural and perisinuous abscesses, for cerebral abscess, for cerebellar abscess, and for sinus thrombosis. The illustrations contained on the ten plates are artistically drawn and beautifully reproduced. They may in general be said to serve their purpose. Some steps in the operations, such as the superficial ones, leave nothing to be desired. Others, however, which attempt to portray the deeper conditions, namely, those of the middle ear and of the semicircular canals, are not so successful, as plasticity is lost. Unquestionably for these conditions drawings fall short, as nothing can replace bone specimens, unless it be stereoscopic photographs of bone specimens, as in Trautmann's Atlas. An excellent and new drawing is to be found on Plate IX., showing exposure of sigmoid sinus, jugular bulb and vein.

The accompanying text treats briefly of the main symptoms, indications for operation, the technique and after-treatment. In addition, closure of a retroauricular opening, lumbar puncture, ligation of the jugular vein, and exposure of the jugular bulb are described. The atlas is unquestionably a very desirable addition to the library of the otologist, and as it fulfils its purpose can be strongly recommended.

A. K.

VI.—Otitis media der Säuglinge: Bakteriologische und anatomische Studien. Von Dr. H. PREYSING, Leipzig. With 40 plates. Published by J. F. Bergmann, Wiesbaden, 1904.

This monograph fills a gap in otological literature. Though the macroscopic pathological changes in the middle ear of sucklings have frequently been described, accurate microscopical examinations have not been made. This fundamental work of Preysing gives us full information of the pathological changes in the ears of sucklings.

The microscopic conditions are excellently portrayed on forty plates.

The accompanying text divides the subject as follows: 1. Bacteriology of the otitis of sucklings; method of autopsy and pathological examination. 2. Normal anatomy; (*a*) tympanic mucous membrane; (*b*) embryonal myxomatous tissue in the tympanum; (*c*) glands in the tympanic mucous membrane; (*d*) dehiscence in facial canal; (*e*) semicircular canals. 3. Patho-

logical changes; (*a*) in the tympanic mucous membrane; (*b*) beginning of the inflammation in the mucous membrane; (*c*) thrombus formation in the mucous membrane of the tympanum and antrum; (*d*) pathological changes in the drum membrane; (*e*) action of paracentesis; (*f*) interference with the myxomatous involution by the otitis media; (*g*) absorption of the tympanic empyema; (*h*) tuberculosis of the tympanum; (*i*) disease of the bone and internal ear in sucklings' otitis.

The old statement that the suckling's ear cannot be examined otoscopically has been corrected by the reviewer. The autopsy findings consequently become more important if verified by examinations in the living. As regards the influence of sucklings' otitis on the gastro-intestinal tract, the author believes that the nutritive disturbances and the gastro-enteritis, if caused by a tympanic empyema, are the result of the absorption of toxic substances from the middle ear by way of the blood and lymph channels, and not of a direct infection with the infectious agents of the otitis media.

A. HARTMANN.

VII.—**Die Otosclerose.** By Dr. A. DENKER, Erlangen. Vol. iv. *Die Ohrenheilkunde des Gegenwart und ihre Grenzgebiete in Einzeldarstellungen*, herausgegeben von Dr. O. KOERNER, with 11 illustrations and 8 diagrams. Published by J. F. Bergmann, Wiesbaden, 1904.

Denker's monograph is exceedingly welcome. It contains all that is important on this subject; anatomy and physiology, macroscopic and microscopic pathology, etiology, functional examination, symptoms, course, diagnosis, treatment, and prognosis.

The functional examination follows the teachings of Bezold. From personal experience the author is convinced of the value of Gellé's test. Regarding Habermann's recently expressed opinion that syphilis is the cause of otosclerosis, Denker states that stapes-anchylosis should be more frequently observed as a "secondary affection," and that though syphilis affects men more frequently than women, otosclerosis is more common in women. Therapeutically the author has observed the favorable action of phosphorus, though he speaks of the possibility of phosphorus poisoning.

The book will serve as an incentive to all otologists for further investigations and help in disseminating knowledge of this affection among general physicians.

G. BRÜHL.

ARCHIVES OF OTOLOGY.

SOME POINTS RESPECTING THE SURGICAL ANATOMY OF THE FACIAL NERVE.¹

BY H. A. ALDERTON, M.D., OF BROOKLYN, N. Y.

THE portion of the facial nerve which chiefly concerns the otologist, when he meditates a surgical attack upon the ear and structures adjacent to it, is that lying between its entrance into the internal auditory meatus and its exit through the stylo-mastoid foramen. A terse, as well as comprehensive, description of the course of the facial nerve between these two landmarks is given by Morris who says: "It enters the internal auditory meatus in company with the pars intermedia and the eighth nerve. As it lies in the meatus it is situated above and in front of the eighth nerve, from which it is separated by the pars intermedia, by sheaths of both the arachnoid and the dura mater and by prolongations of the sub-arachnoid and subdural spaces. While it is still in the meatus it is joined by the pars intermedia, and thus the trunk of the seventh nerve is formed. At the outer end of the canal the trunk pierces the arachnoid and the dura mater and enters the aqueduct of Fallopius, in which it runs forwards and slightly outwards to the hiatus Fallopii, where it makes an angular bend, *the external genu*, round the anterior boundary of the vestibule, and is enlarged by the formation of the geniculate ganglion on its anterior border. From the external genu it runs backwards in the aqueduct along the outer wall of the vestibule and the inner wall of the tympanum, above the fenestra ovalis, to

¹Read before the Section on Otology, New York Academy of Medicine, October 20, 1904.

the junction of the inner and posterior walls of the tympanic cavity ; then, bending downwards, it descends, in the posterior wall, to the stylo-mastoid foramen."

The writer, with a view to satisfying himself in regard to certain relations which the facial nerve bears to neighboring parts, boiled a number of temporal bones until the soft tissues were entirely disintegrated, and, after drying thoroughly, injected the facial canal through the stylo-mastoid foramen with a boiling solution of carmine in beeswax, which quickly cooled and solidified after coming in contact with the cooler bone. Two approximately horizontal sections were then made with the saw, one on a level with the spina supra-meatum, and the other with the floor of the orifice of the osseous external auditory canal as nearly as that could be determined. Eighteen adult bones were selected as having been prepared with sufficient care, and offering correct data because of this, for examination.

A close scrutiny for dehiscences, as evidenced by the extrusion of the colored wax through the bony envelope of the canal, revealed only one probable and one doubtful deficiency in the wall of the facial canal where it lies within the mastoid process; this is as was to be expected, for in all the specimens there existed a condensation of the bony tissue around the facial canal in this region, in the majority being truly compact in character, but in a few bones showing simply a much denser cancellous structure than in the cellular parts of the mastoid. Seven marked and two dubious dehiscences, in as many bones, were discovered as a result of the examination of that portion of the facial canal bordering on the cavities of the middle ear; all of these were in the neighborhood of the fenestra ovalis. No dehiscences were discovered in the bony wall between the facial canal and the labyrinthine cavities. It is not necessary that this proportion of dehiscences to bones examined should be maintained in further investigations for us to be amazed at the infrequency of the occurrence of facial paralysis as a complication of middle-ear inflammations when we consider how favorably disposed the nerve lies for injury.

The next point investigated was the distance existing

between the internal surface of the external wall of the facial canal and the spina supra-meatum—in other words, between the facial canal and the spine. The average measurement* for all eighteen bones was found to be *15.9mm*, the minimum was *14.2mm*, and the maximum *20mm*. Nolténus, as the result of an examination of twenty-two bones by means of horizontal sections, found the average distance between the supra-meatal spine and the canal for the facial nerve to measure *15.5mm*, the minimum being *11mm*. Combining these results will give an approximate average of *15.7mm*, with a minimum of *11mm*.

The distance between the internal surface of the external wall of the facial canal to the posterior-inferior angle of the external margin or orifice of the osseous external auditory canal was next measured by means of the second horizontal section made as above described. The average distance was found to measure *12.1mm*, the minimum measurement not exceeding *7.5mm*. This external point of measurement was selected because it is left untouched in the operative field longer than any other portion of the external surface of the mastoid apex.

It follows from these findings, supposing them to be approximately correct, that we may feel warranted not only in bravely attacking the bone along the level of the spine up to a depth of *11mm*, but also on a level with the floor of the outer orifice of the external auditory canal up to a depth of *7.5mm*. Beyond these distances we must proceed with extraordinary care, using all the accessories in the way of illumination, hemostatics, and instrumentation that are given us.

The facial canal in its vertical portion was found to be at an average distance of *3.5mm* from the nearest point of the posterior edge of the annulus tympanicus, the minimum measurement being *3mm*. Examining now the sulcus internal to the posterior edge of the annulus tympanicus, which sulcus forms the lower portion of the posterior tympanic wall, and we find that the distance between the tympanic cavity in this region and the nearest portion of the descending arm of the facial canal averages only *1.4mm*

with a considerable number of the specimens not exceeding the minimum measurement of .5mm by any considerable margin. These two regions, the posterior edge of the annulus tympanicus, and the posterior tympanic wall, are frequently involved in carious processes which have also affected the larger ossicles, especially the incus, and in which the perforation of the membrana tympani is in the posterior superior quadrant or in the posterior half close to the annulus—in fact, the posterior edge of the perforation is usually formed by the annulus. The adjacent cutaneo-periosteal lining of the inner posterior external canal wall by its swollen, congested, and tender condition gives evidence of the underlying pathological process; the posterior free edge of the annulus and the sulcus behind it are covered by more or less exuberant granulations, and a cholesteatomatous condition is apt to affect the neighboring portions of the middle-ear cavity. Imagine the ease with which the pathologic process or the curette of the surgeon can break down the defensive wall!

The wax injection failed to make its escape from the aqueduct of Fallopius into the internal auditory canal, notwithstanding that it did escape from the hiatus Fallopii into the middle cerebral fossa in seven of the specimens, and would probably have done so in all had an injecting material been used that could have been more easily liquefied or that would have remained so longer. This fact certainly indicates that mechanically the track of any infection passing from the mastoid or middle ear along the facial canal is an easier and more direct one towards the middle cranial fossa than towards the internal auditory canal and thence into the posterior cranial fossa. Apropos of this, it is interesting to recall to your mind the statement of Macewen that inflammation may thus extend along the perineural sheaths to the middle cranial fossa from the middle ear, passing thus along the facial and then along the greater superficial petrosal nerve to the anterior surface of the petrosal bone. Also, Hilgermann's report of six cases of involvement of the Gasserian ganglion in middle-ear suppuration may have a bearing on this anatomical configuration of the parts. The

following case is selected as fairly typical (*Year-Book of Eye, Ear, Nose, and Throat*, 1902, p. 184).

W. M., thirteen years old, had after measles, at the age of four, a discharge from the left ear. During the last two weeks the otorrhœa was accompanied by headache, fever, vomiting, vertigo, with a tendency to fall to the right. On admission, the temperature was 39.8° C. and the pulse 88 to 100. The head was held more or less in a fixed position, though all movements were passively possible without pain. The anterior and posterior margins of the mastoid were very tender, as well as the insertion of the sterno-mastoid muscle; the canal was filled with fetid pus which accumulated rapidly.

Operation.—The antrum was opened and the mastoid cells were found filled with pus; the antrum contained pus and granulations; the tegmen tympani seemed solid; the sinus and dura of the middle fossa were exposed; both appeared healthy, though the bone on the posterior surface of the antrum appeared softened. The sinus was incised but contained fluid blood. Distinct rigidity of the neck continued; high fever and other marked meningeal symptoms ensued, and the patient died the following afternoon.

Autopsy.—Extensive meningitis, sinus free. On examining the apex of the pyramid, the Gasserian ganglion was found bathed in pus. On retracting the dura in the region of the fovea, the dura could not be recognized as such, but was replaced by soft granulations. At this place, a very delicate connective-tissue band, perhaps a nerve, perforated the bone and passed into the cavity mentioned below. The ossicles were normal and imbedded in hypertrophied mucous membrane. From the floor of the hypo-tympanic recess, a system of pneumatic spaces filled with pus and granulations passed inward between the jugular fossa and the labyrinth, then proceeded inward and forward to the apex of the pyramid. The previously mentioned thin area of bone at the fovea trigemina corresponded to the inner wall of a large air cell which surrounded the carotid canal and was filled with pus. Evidently the inflammation passed along the delicate fibrous band to the cavity of the Gasserian ganglion.

Bearing the known relations of the facial canal and the limits of safety in measurements in mind, it should not be difficult for the careful operator to do the ordinary Schwartze operation indicated in acute cases without endangering the facial nerve, unless the bony wall of the facial canal has been pathologically destroyed and its place taken by granulation tissue and purulent debris, thus disguising the presence of the facial nerve and exposing it to instrumental attack. Such exposure of the nerve does not necessarily result in an inflammation of the nerve with a consequent impairment of function. Our findings in regard to the great frequency of the occurrence of dehiscences also indicate the great power of resistance that is exhibited by the exposed facial nerve. Notwithstanding the great number of cases of acute and chronic inflammation of the middle ear seen by us, the occurrence of a complicating paralysis of the facial nerve is a matter of considerable rarity. Its occurrence after a surgical attack is not a matter of such proportional rarity.

In removing the larger ossicles or on curetting the tympanic cavity to remove granulation tissue and carious bone, two regions especially should be treated guardedly. There is reason to fear the forcible use of the incus extractor, whether hook or curette, in the region just above the oval window and backward from this toward the floor of the aditus. The other region is that forming the bony posterior wall of the tympanic cavity and adjacent portion of the annulus. Curettage here or removal of the annulus by any other means is certainly fraught with great danger to the facial nerve. Luckily, should such an accident take place while curetting, the nerve is rarely entirely severed, so that the outlook for ultimate recovery of power is much better; though even when the nerve has been completely cut through by disease or surgical interference, there still remains a hope of regaining control over the paralyzed muscles. It is in doing the so-called radical operation that the greatest danger to the nerve exists, which danger is so much the less the greater the skill and knowledge of anatomy possessed by the operator,—great carefulness is needed even by such to guard the patient from an injury which may leave lifelong

disfigurement. Preferably crowd into the sinus wall or into the wall of the middle cranial fossa rather than jeopardize the integrity of the facial nerve. It is thought that with all care and in cases in which we are sure that we have not trespassed upon the confines of the facial canal, we sometimes shall see the nerve affected after a period of days following the operative attack. Having then avoided the nerve in the mastoid and attained the antrum, the same care must be exercised to prevent injury to that portion of the nerve lying near the tympanic cavity. Stacke's protector should be used with all gentleness, and it is a question whether it would not be better to discard it in removing the outer wall of the aditus and attic and use as a substitute gauze packing passed into the aditus and carried along into the attic as the bone is removed. The contrivance of a compact, strong and efficient bone punch similar to Dench's, working from within outwards, to remove the bridge of bone, is eminently to be desired; those already designed have the disadvantage of slipping under certain conditions and in lacking the necessary rigidity and strength for the work. Possibly the new punch recently devised by Kerrison may meet the requirements; the writer has not as yet had an opportunity to try it.

The facial nerve at its exit through the stylo-mastoid foramen may be endangered by the attempt to expose the sigmoid sinus downward and inward toward the bulb of the jugular; the operator should aim to keep well back of the anterior margin of the apex of the mastoid.

A CASE OF CHRONIC PURULENT OTITIS WITH
CHOLESTEATOMA AND NUMEROUS ENDO-
CRANIAL COMPLICATIONS—OPERATION—
RECOVERY—WITH REMARKS UPON THE
DIAGNOSTIC VALUE OF LUMBAR PUNC-
TURE.

BY DR. ARNOLD KNAPP, NEW YORK.

K. W., sixteen years of age, suffered from double purulent otitis after scarlet fever at six. After this the hearing gradually failed and now she is totally deaf. She has also passed through an attack of interstitial keratitis, and she presents the typical saddle-shaped nose and teeth characteristic of inherited syphilis. She was treated in the dispensary for the chronic purulent otitis with cholesteatoma, and the adenoids were removed. During the past year she had suffered from pain in the left ear and vertigo. One week ago after taking cold she became quite ill with chills, nausea, and severe headache.

On admission, February 6th, the left canal was found narrowed and filled with fetid pus. There was a well-marked and very tender swelling over the left mastoid. T. 101.6°, P. 140.

The operation was immediately undertaken, and an incision over the swelling evacuated pus under the periosteum. A fistula was found in the mastoid fossa, which led into a large cavity occupying the entire mastoid process. The sinus and neighboring dura were bare and covered with granulations. The sinus seemed soft. The inner extremity of the posterior bony wall was partly destroyed, making a broad communication with the tympanum and auditory canal which was occupied by a cholesteatoma and granulations. There was a large central defect in the external semicircular canal, which contained granulations. The tegmen antri appeared healthy except on close examination. A small

thread of dura-like tissue protruded, and a very minute quantity of pus appeared. After removing the tegmen some more pus was encountered. The opposing surface of the dura was covered with apparently healthy granulations. The entire region was carefully inspected with a probe, but no fistula was found. The wound was packed and kept open. After operation all the symptoms disappeared and the subsequent course was uneventful.

Two weeks later the patient was again put under ether and a Panse meatoplasty was performed. Granulations were removed, and there had been some recurrence of cholesteatoma in the tympanum. After another week the patient was discharged and returned regularly for dressings.

On March 4, 1904, granulations in the depth of the wound were curetted. That evening on returning home she complained of a chill and headache, and vomited. She passed a very poor night, and on the following day she was very ill, complaining of pain in the lower extremities. On the 6th and 7th, no further chills but very restless, though sensorium was normal. Nausea and headache.

Re-admitted on the 8th. T. 104°, P. 100. She appeared very ill, was restless, and complained of pains in head and lower extremities, but was not unconscious. Slight twitching, head drawn back, very averse to being moved. Very thirsty, swollen lips, vomited. The wound was dressed and found clean. There was no fistula to be seen. Lumbar puncture evacuated a very turbid fluid. This was examined microscopically for bacteria, but none were found. Subsequent culture of the same fluid proved it to be sterile.

On March 9th to 12th the temperature gradually came down to 100°-101°, P. 90-100. She was restless, nauseated, complained of left-sided headache, and pain in the legs. She was conscious and took nourishment. Eyes normal. No change in the wound.

A gradual general improvement thereupon followed; the temperature became normal on the 19th, and on the 26th of March she went home.

The wound in the ear rapidly healed, except a small focus near the oval window from which a small polyp was removed from time to time, and her convalescence was uninterrupted.

On May 24th the ear was dry and she was apparently in much better health than she had enjoyed in years.

Remarks.—The case is of interest from a number of stand-points. Owing to the girl's very poor physical and mental condition, and as the cholesteatoma did not cause any marked symptoms, the radical operation was not insisted upon during her attendance at the dispensary. During the preceding two years she came only irregularly until the day when the operation was found necessary. She presented then all the symptoms of an acute retention of pus in the middle-ear cavities, and appeared so ill that we were prepared for an intracranial complication.

The operation showed, beyond the cholesteatoma and the large accumulation of pus in the mastoid, an extradural abscess in the middle cranial fossa, caries of the labyrinth, with granulations and pachymeningitis in the posterior fossa. As no fistula or lesion was found in the dura suggestive of a deeper trouble, an exploration of the brain was not made.

The symptoms were all relieved and the subsequent course was uneventful until, after curetting the granulations in the depth of the ear, one month after the first operation, the patient became very sick with high fever, great restlessness, some delirium, pain in the head and in the lower extremities, rigidity of the neck, and vomiting—all symptoms suggestive of meningitis. This appeared to be still more confirmed when the lumbar puncture elicited an extremely turbid fluid containing many leucocytes. The condition of the patient was so critical and the diagnosis of purulent meningitis so probable that an operation was not considered advisable. The examination for bacteria in the specimen of lumbar fluid, both by cover slide and by culture, proved negative. Much to our surprise, the case slowly improved and proceeded to recovery.

It seems probable from the conditions found at operation that the labyrinth was very much affected and that the disease extended to the meninges or a localized meningitis was present. The removal of the granulations then started up a meningeal infection which was not, however, of a virulent type.

In Halle, where they systematically perform lumbar punc-

ture and lay considerable prognostic stress upon the results of the examination of the fluid, they no longer regard turbidity of the lumbar fluid alone as an evidence of a diffuse purulent meningitis and a contra-indication to operation, but demand the additional presence of bacteria (Schultze, "Beitrag zur Lehre von der otogenen Meningitis," etc., *Archiv f. Ohrenheilkunde*, lviii., p. 14, 1903). On the other hand, Gruening, in a recent meeting of the New York Otological Society (these ARCHIVES, vol. xxxiii., p. 224), reported the case of a young boy who exhibited meningeal symptoms and where the spinal fluid was opaque and contained streptococci and the boy recovered.

THREE CASES OF TUMOR OF THE EAR.

BY DR. GERBER, KÖNIGSBERG.

(With two illustrations on Plates I. and II., *Zeitschrift f. Ohrenheilk.*, Vol. XLV., No. 1.)

Translated by Dr. ARNOLD KNAPP.

I.—FIBROMA.

C. A., seventeen years of age, of healthy family, has always enjoyed good health. The present illness began with the appearance of a small pimple on his left ear a year and a half ago, which did not produce any pain or other symptoms. Recently it has enlarged so that the ear is somewhat longer than normal. There are occasional hemorrhages from the tumor.

The patient is a small, pale, otherwise healthy-looking individual. The left auricle is to its greatest part hidden by a tumor as large as a plum, which rises with a rather broad base directly below the helix and covers the anti-helix, the spine of the helix, the concha, and the entrance to the auditory canal. It extends to the lobule and projects externally and posteriorly beyond the auricle. The tumor is ovoid in form, about 4 cm long and 2½ cm broad. It is movable, and its base measures 5-7 mm. The covering of the tumor, which above is distinctly noticeable as the continuation of the integument of the external ear, presents in its lower half a white, horny, wart-like appearance. The epidermis on the lower two-thirds is partly macerated, and is replaced by scab, blood-clot, and excoriations. The tumor is uniformly hard. (See Figure 1.)

Examination of the rest of the ear shows normal conditions. There are no glandular swellings.

Enucleation of the tumor took place under local anæsthesia

by curved incisions surrounding the root. The cartilage is exposed and found perfectly normal. Suture. Primary union. A relapse has not occurred up to the present day—that is, after four years. Histologic examination showed a dermoid tumor composed of fibrous connective-tissue with few blood-vessels, elastic fibres, and distinct round-cell infiltration on the surface.

True fibromas of the external ear are rare. They are most frequently observed in the lobule, where they arise after puncture for ear-rings and other traumatisms.

Fibromata at other parts of the auricle are extremely rare. They have been described by Habermann, Steinbrügge, and Anton.

This tumor is interesting not only on account of its localization, but also on account of its size.

II.—TUBERCULOMA.

A. W., twenty years of age, claims always to have enjoyed good health. The father is living and healthy. Four brothers and sisters are also well. Two died early. The mother died from a pulmonary affection at the age of forty-one. During the past year the patient has had transient attacks of hoarseness, which did not, however, require medical aid. Since earliest childhood her immediate family have always noticed an enlargement of the left lobule. This enlargement was at first small, gradually increased, and was only painful on palpation at intervals. After a blow it sometimes bled freely. The surface would then present small elevations and turn bluish red. For a long time she has had no further symptoms, and only comes to have the tumor removed for cosmetic reasons.

The patient is a strong, healthy-looking girl. The physical examination showed no abnormality. The left auricle presents a uniform enlargement of the lobule, which has about the size of a small walnut. The contours are, however, normal, and the color is normal. The consistency is that of the normal lobule. The lobule has been punctured for an ear-ring just as the one on the other side. No glandular involvement.

This was evidently not a heteroplastic growth but a tumor consisting principally of hypertrophic normal tissue, and I regarded the condition as one of macrotia.

Under chloroform narcosis the lobule was resected, and it was

attempted to shape the contours exactly like those of the other ear. Pathological tissue was encountered at no place. It was possible to obtain a very good cosmetic result.

Histological examination of the excised piece showed the typical picture of cutaneous tuberculosis: a not particularly fibrous connective-tissue with round-cell infiltration, many epithelial cells, and several giant-cell tubercles.

Tuberculosis occurs in the auricle in the lupus form. True tuberculosis is very much more rare, and occurs in the form of miliary cutaneous tuberculosis with ulcers, or as perichondritis, or as nodular tuberculosis, as has been described by Eiselsberg and Haug. In all of the cases of this last category, the lesion was the result of an inoculation during puncture of the lobule—in other words, a vaccination tuberculosis.

The striking features of this case are that a puncture had not been made in the lobule, and that the nodules appeared without apparent cause in an otherwise healthy girl.

III.—CARCINOMA.

J. A., forty years of age. His father died at the age of sixty-three from phthisis. The mother died at fifty-eight from unknown cause. The patient himself, though delicate, has always been healthy. He has passed through no particular illness and does not remember the onset of the present right-sided otorrhœa, which has existed since childhood. He has never had pain in the ear up to within a year. Then the right auditory canal swelled up and severe pain was experienced. He was operated upon with some improvement in his condition. After three months the same pain recurred with some occlusion in the right ear. About a month ago a growth formed behind the ear, which rapidly increased to the size of a fist.

The patient is a medium-sized, sparely-built man of fair condition of nutrition. The innervation of the right half of the face is normal. Hearing right. Whisper and ordinary voice zero. Weber lateralized to right. The external canal is filled with lobular, hard brownish masses of granulation tissue, which apparently originate from the entire circumference of the canal. Attempt at probing caused profuse hemorrhage. The auricle up to the thickened lobule is normal.

Directly behind the auricle, there is an enormous tumor mass extending from the attachment above the auricle down to the neck. The upper parts of the tumor are covered with red and bluish shining skin. In the lower parts, the integument is excoriated and covered with black clots and fresh blood. The tumor measures about 9cm by 5cm. Its consistency is a distinctly fluctuating one, while below it is soft. (Figure 2.)

There are a number of small, hard cervical glands to be felt on the right side. A small particle of the tumor was removed from the auditory canal and examined histologically, and proved to be typical epithelioma.

The tumor behind the ear was regarded as in part a hematoma probably originating from erosion of a vessel by the tumor process.

As the patient insisted upon operation notwithstanding that the danger had been fully explained to him, an incision was made 2cm behind the insertion of the auricle over the entire tumor. The knife cut as through butter, and a large cavity was entered, filled in part with blood coagula and partly with granulations. After careful removal of these masses, a triangular defect was found in the bone, with its base towards the posterior auditory canal and the apex directed towards the posterior cranial fossa, measuring about 2cm horizontally and 3cm vertically. The posterior membranous canal is infiltrated with tumor nodules. The antrum and surrounding cells are filled with granulations and some pus. The attic and tympanum are in the same condition. There are no ossicles. The posterior wall of the tympanum, the prominence of the horizontal semicircular canal, and the facial nerve show normal conditions. After removal of the granulations from the upper wall of the antrum and of the attic, a large defect is visible, exposing the dura of the middle cranial fossa. The dura itself appears perfectly normal. On attempting to remove the bone posteriorly, a copious hemorrhage occurred, evidently coming from the sinus. Packing and dressing applied.

The subsequent course was uneventful, and four months after the operation the patient died of debility.

Carcinoma of the ear belongs to the rare tumors, if we exclude the frequent isolated carcinomas of the auricle. In 3365 autopsies, Müller found 128 carcinomas, of which not

one belonged to the ear, nor to the nose. The external and internal nose appears to have the same relation to carcinoma that the external and internal ear does. There is one case of carcinoma to from 5 to 10,000 other ear-diseases. Recently the reports of this condition of the ear have become more frequent, and there are probably 40 to 50 such reports. Zeroni says correctly that the reported cases corresponding to the rarity of the disease are not sufficiently frequent, so that it is not superfluous to report additional cases, even though they do not present any unusual features.

This clinical case does not differ from the chief monographs on the subject. It also occurred in a patient who was over thirty and who suffered from chronic purulent otitis, and the right ear also was affected.

The origin of the tumor cannot in this case be definitely determined as is the usual condition, though the histological examination and the method of extension, together with the non-involvement of the facial nerve, show the external auditory canal as the probable origin.

It is especially interesting to me to note the resistance which the posterior auditory canal wall and the posterior tympanic wall offered to the tumor. Thus there was no facial paralysis notwithstanding extensive involvement of the bone in the mastoid process, in the squama, and so forth.

The resistance offered by the dura to infiltration with tumor masses has been previously commented upon.

Especially noticeable are the enormous size of the tumor, and the hemorrhage, which is presumably directly responsible. The origin of the hemorrhage could not be distinctly determined. The sinus wall was not infected, and the formation of a thrombus had not taken place up to the time of operation.

Though it was impossible to remove all of the tumor, on account of the hemorrhage from the sinus, we should at least be able by operation, as in operations in other regions, to exercise a retarding influence upon the farther development of the tumor. This, however, has only been accomplished by Jansen in one case.





ANGINA AND PHLEGMONOUS PHARYNGITIS
FOLLOWED BY PURULENT THROMBOSIS OF
THE CAVERNOUS SINUS AND PURULENT
BASILAR MENINGITIS.

BY DR. CARL TOLLENS,

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Translated from *Zeitschr. f. Ohrenheilk.*, Vol. XLIV., p. 225.

THIS case illustrates the fact that severe septic processes, which may lead to dangerous complications and death, may be associated with an apparently harmless catarrhal angina.

The patient was a servant, nineteen years of age, who had been taken ill three days before with pain in the neck and difficulty in swallowing, and now complained principally of severe headache.

On admission, June 30, 1902, a well-built woman with high fever. The right cheek presented a striking red swelling extending to the upper margin of the zygomatic arch and back to behind the right ear. The ear itself was normal, the right mastoid process slightly tender. Right catarrhal conjunctivitis. The pupils uniform and react promptly. Normal eye-grounds. The pharyngeal structures are the seat of an intense inflammation. They are very much swollen and very red. There is no exudate. The right half of the soft palate is swollen without apparent fluctuation. The posterior pharyngeal wall is swollen and red without any collection of pus. The speech is that of swollen tonsils, and there is a moderate inflammatory ankylosis of the jaw. The glands at the angle of the jaw are somewhat enlarged. The jugular veins present no abnormality. The other organs are normal, especially the heart and kidneys.

A broad incision was made into the soft palate without evacuating any pus. Ice applications were made to the head and the neck.

June 31st.—T. 40° C. P., 124. In the course of the day the headache and pain in the back of the neck increased. There was more swelling in the region of the right cheek and behind the right ear. Paracentesis of the right *Mt* was to-day performed because the drum membrane was slightly clouded and injected, but without evacuating any pus. There was slight protrusion of the right eyeball, with swelling and œdema of the lids. The right pupil was larger than the left. Both are round and react promptly. The first branch of the fifth nerve on the right side is tender. There is no change in the condition of the throat.

July 2d.—T. 39° C. P., 136, R. 38. Both eyes are protruded. Chemosis of both conjunctivæ. The right pupil remains larger than the left, though they react promptly. Eye-grounds: the disks are sharply defined, somewhat pale, with well-filled vessels. There are no inflammatory changes. The swelling of the right half of the face has increased. The top of the right mastoid process is tender, as well as the region of the mastoid emissary. The right *Mt* is clouded, reflex preserved. Another paracentesis is performed without result. In the throat the wound from the incision is somewhat infiltrated. There is moderate discharge of thick pus containing streptococci in pure culture. The right half of the soft palate is still very prominent. The posterior pharyngeal wall is very much inflamed, and is incised without producing any pus. The jugular veins are normal. The patient is somewhat stupid and complains of headache and rigidity of the neck. Repeated vomiting. Hard, slow pulse. Abdomen soft. Peculiar rhythmic oscillation of the head.

July 3d.—Pronounced meningitic symptoms. The eyes protrude still more with increased chemosis. Catarrhal râles over both lungs. Moderate expectoration. There is no abscess to be felt in the neck. The pharyngeal structures are very swollen. There is considerable purulent discharge from all the incisions.

The force of the heart gradually failed and the patient died on July 4th.

Autopsy.—After removal of the skull-cap, the dura was found tense. The vessels contained fluid blood. The longitudinal sinus and the two transverse sinuses contained fluid

blood. After removal of the dura, the pia on the convexity presented a dilated condition of the blood-vessels. At the base, in the region of the optic chiasm, and on the surface of the cerebellum there is a purulent exudate. After removal of the brain, the dura in the middle fossa is clouded and covered with a multitude of fine red spots.

The base of the skull is then removed in connection with the organs of the throat. On the right side, the Gasserian ganglion is surrounded by a purulent fluid. The cavernous sinus is thrombosed and contains a grayish-yellow coagulum firmly adherent to its walls. All of the vessels emptying into the sinus are in this same condition. On both sides, the ophthalmic veins were found filled with pus. Cross-sections through the orbits showed that the optic nerves were free from pus and that the maxillary sinuses were empty. The upper region of the neck and the buccal cavity are swollen and as hard as a board. The large arteries and veins contain fresh blood coagula. The mucous membrane of the tongue and of the pharynx is discolored blackish-green, and covered with an exudate. The tonsils are also discolored, and very swollen. The right one is as large as a walnut and soft on pressure. This has constricted the opening into the throat to such an extent that a finger can scarcely be passed into the œsophagus. The epiglottis is grayish-black and covered with an exudate. The entrance into the larynx normal. The laryngeal and pharyngeal mucous membrane is swollen and contains tenacious mucus.

There are small abscesses in the apices of both lungs. In the rest of the parenchyma there is a disseminated hemorrhagic inflammation of the lungs. The heart is normal; the peritoneum somewhat glistening. In both kidneys, numerous septic emboli. The kidneys, the liver, and the spleen are all enlarged.

This is unquestionably one of the cases which Senator first described as acute infectious abscess of the pharynx, and which were later fully described by Felix Semon as acute septic inflammation of the pharynx and of the larynx. According to the first author, this is an acute infectious disease, consisting of a phlegmonous inflammation of the

pharyngeal mucosa, and which with symptoms suggestive of a severe sepsis usually leads to death after the onset of laryngeal œdema. Semon includes these cases of Senator's, but includes also erysipelas of the pharynx, most cases of angina Ludovici, and the infectious angina of the French, as all of these start from the same infectious agent. In all, the severe, often fatal, course with septic symptoms and the tendency of the processes to extend either per contiguity or by septic emboli is marked. The inflammation usually extends downwards. A case has been reported by Stein of phlegmonous angina which was followed by purulent meningitis.

Though in our case, through the complication with sinus thrombosis and meningitis, the disease and its course were somewhat obscured, it cannot be denied that from the very onset the infection was a particularly virulent one. The patient on admission was very ill, though she had enjoyed perfect health three days before. In addition to the intense inflammation of the pharyngeal structures, there was marked swelling of the right half of the face, which probably indicated the early involvement of the cavernous sinuses. There was no exudate found in the mouth.

According to the autopsy, the purulent inflammation presumably extended along the delicate veins which pass from the venous pharyngeal plexus through the base of the skull to the cavernous sinus. The pharyngeal plexus and the entrance of the veins into the cavernous sinus were both found at the autopsy filled with pus. Other paths of infection between the purulent condition in the pharynx and the cavernous sinus could not be discovered, so that it is very probable that the process took its course along these veins.

More frequently, in cases where purulent meningitis follows an abscess in the mouth and pharynx, the path chosen is by way of the spheno-maxillary fossa, the foramen rotundum, the Vidian canal, and the inferior orbital fissure. Scheff speaks of an extension of a purulent inflammation from the roots of the wisdom teeth to the meninges by this path. This same course is mentioned in Roser's *Topographical Surgery* and in Weber's *Surgery*.

TWO CASES OF ABSCESS OF THE TEMPORAL LOBE OF THE BRAIN.

BY DR. F. VOSS, RIGA.

Translated from *Zeitschr. f. Ohrenheilk.*, Vol. XLIV., p. 275.

Case 1.—Brain abscess after acute otitis media.

P. S., forty-two years of age, laborer, fell from a framework six weeks ago, striking the left side of the head, and remained unconscious. There was bleeding from the ear, severe vertigo, vomiting, and pain in the surrounding parts of the ear, which kept up for about two weeks, when the vomiting and the vertigo ceased. The pain, however, became more severe, especially behind the ear. The ear was dry for three and a half weeks and then began to discharge profusely, associated with vertigo. The patient was often delirious at night, and complained of loss of memory. Four days before admission to the hospital the pain became suddenly very severe. The patient was unconscious and there were convulsions. The last two days his condition has been somewhat better, but at night he cannot sleep.

January 8, 1902.—The patient is a medium-sized, heavily set-up man, who became very much excited during the examination, talked a great deal, and moved about constantly. There was nothing abnormal in the lungs or in the heart. Pulse, 80, irregular; temperature, 37.2° C. The facial nerve was intact; rather profuse purulent discharge from the left ear. The mastoid process is externally unchanged but tender on pressure. The canal is wide and not swollen; the perforation was below and as large as the head of a pin. Eye-grounds normal.

On January 9th the condition was unchanged, the symptoms were the same, the temperature rose in the evening, and at night the patient was delirious.

January 10, 1902, operation.—Moderate pus in the antrum. The posterior wall appeared rough. The middle cranial fossa was then exposed, and a cavity in the bone was found $1\frac{1}{2}$ cm large, filled with granulations and pus. After removal of the granulations and pus, there were a small uninjured vein and an artery to be seen passing over the exposed portion of the dura. The wound was packed.

The temperature dropped in the evening, and on January 12th fell to 36.8° . There was no pus. The sensorium was free, and there was no further vertigo. On January 13th, however, the temperature again rose, the pain became more severe, and there was slight delirium. At dressing, the wound was found entirely healthy. Vomiting.

January 14th.—Temperature varying between 37.7° and 39° . The patient was quite stuporous, with violent delirium. At the dressing the dura was incised and the knife passed in various directions without any result. The points of puncture bled freely. Packing. The pulse was never under 80, and varied between 80 and 90. On January 15th the temperature fell; the pulse rose to 104 and became irregular. Great restlessness. Death ensued on January 17th.

Autopsy showed the presence of an abscess as large as a cherry in the lower surface of the temporal lobe, filled with thick, yellowish-green, fetid pus. The scalpel had passed by at a distance of 2 cm. The surrounding parts of the brain were infiltrated with pus and softened. The abscess had perforated into the ventricle. The sinus was normal, and there was no fracture of the base.

Remarks.—Three and a half weeks after a fall on the head, with unconsciousness, and hemorrhage from the left ear, the left ear began to discharge copiously. The increase of the ear pain suggested the presence of a fracture of the base of the skull, and it seemed that thus the ear had become infected. The operation revealed an extra-dural focus of granulation-tissue and pus, and excluded the presence of a fracture of the base passing through the ear, because the bone in the surrounding parts could be examined well into the healthy tissue, and a branch of the middle-meningeal artery with its vein was seen to pass uninjured over the dura. The

fall of temperature with alleviation of pain seemed to show that we had exposed the only focus, as the pulse had never sunk below 80 and no symptoms of an abscess were present. The later exploration of the temporal lobe, even if it had struck the abscess and not passed 2cm away from it, would have been too late, as a perforation into the ventricle had already taken place. As no injury was present to the external coverings of the scalp, the rupture of the drum and the subsequent purulent otitis must be held responsible for the subsequent course.

Case 2.—Large abscess in the temporal lobe, containing gas, after chronic purulent otitis media. Operation. Recovery.

R. K., fourteen years of age, had suffered four years from a right-sided discharge of the ear which had never given him any pain and was never treated. On October 16, 1902, patient was taken ill with violent headache, vomiting, and fever. He was given a powder for the fever, and perspired very freely. After this the fever is said not to have returned. Four days later he felt he had recovered his health so that he was again able to return to school. The headache, however, immediately recurred. No vomiting, no fever, no convulsions, no paralysis, no pain in the ear. At the beginning some vertigo.

October 23, 1902, 3 o'clock.—The boy was well-nourished, but appeared to be very ill and complained of very severe frontal headache. There was no pain in the region of the ear. Throat and lungs normal, pulse 68, regular and uniform. The right canal was not stenosed and contained a little fetid pus. A large perforation was present; the hammer could not be seen. The mastoid process was externally unchanged and not tender. There was no pus on percussion. No paralysis of the ocular muscles. Slight horizontal nystagmus of both eyes. Vision normal. Eye-ground of left eye is normal; the disk of the right eye is yellowish-red, the margins blurred, the vessels not tortuous. The lids are somewhat œdematous. The urine contained no albumin. No vertigo, no staggering, even with closed eyes. Temperature 37.5°. In the evening the temperature was the same, but the pulse had dropped to 58, irregular, and accompanied by headache so severe as to make the boy cry out. Immediate operation, beginning with the usual radical operation. In the antrum there

was a small amount of granulation tissue but no especial caries of the walls. The anvil was removed; there was no hammer to be found. The sinus was exposed and found healthy. With the bone forceps the bony opening was enlarged so that the dura of the cerebellum and of the temporal lobe were exposed. A small vein emptying into the sinus was wounded and bled profusely. The dura in both regions appears entirely normal. It is translucent and thin. The temporal lobe was punctured with a syringe. The second puncture withdrew a frothy, grayish-brown, intensely fetid fluid. The incision which was then made evacuated half a glass of the same fluid intermingled with gas. The wound was packed with iodoform gauze. In the evening the pulse had risen to 76, it was no longer irregular. On the following day there was no headache, no vomiting. The general condition was good, pulse varying between 80 and 90.

October 28th.—The gauze packing was moist, but there was no pus. The large cavity in the brain diminished rapidly, so that only a small strip of gauze could be introduced. A fistulous path $3\frac{1}{2}$ to 4 cm long led into the depth, so that, on November 26th, I replaced the gauze by a drainage tube. This was gradually shortened and left off on December 3d. The patient got up for the first time on December 7th, and on December 21st the wound was entirely healed. The ear was firmly closed by a scar. Eyes normal, no nystagmus.

ON OTITIC PYÆMIA.

BY DR. RICHARD FREYTAG, MAGDEBURG.

(*Zeitschrift f. Ohrenheilk.*, Vol. XLV., p. 127.)

Translated by Dr. ARNOLD KNAPP.

Case I.—Acute otitis media after measles. Empyema of the mastoid process on both sides. Osteophlebitic pyæmia. Metastasis in the sterno-clavicular articulation.

L. Z., seven years of age, passed through an attack of measles in May, with pain in both ears and otorrhœa. He was referred to me on account of the continuous pain in the ear.

June 7th.—A well-developed child of lively disposition; presents a very apathetic appearance. There is no special complaint except pain in the right ear. The right mastoid process is distinctly tender.

Both drum membranes are red and swollen. Perforation down and in front, copious discharge. No appetite. Moderate bronchitis. T. 37.6° C., P. 86.

On the following morning there was a chill followed by perspiration. In the evening the temperature was normal. The chill was repeated.

On July 10th, temperature 40.2°, dropping to 37° in the evening. The right mastoid is more painful.

Another chill on July 12th. Temperature 41°. Urine slightly clouded.

Operation on that day. Soft parts normal. The cortex shows numerous bleeding points. The bone is soft and contains blood. The cells and the antrum are filled with pus and granulations. The sinus was displaced forwards and was exposed at the beginning of the operation. It appeared perfectly normal both to inspection and on palpation. The surrounding bone was also healthy. Bandage.

The temperature in the evening rose to 40.3° without a chill.

July 15th.—T. 37.8° – 39.6° . The child complains of pain on moving his right arm. A cause for this is found in a decided tenderness and swelling of the right sterno-clavicular joint. A bandage was applied and salicylate of soda ordered.

July 16th.—T. 37.5° . The tenderness of the joint has somewhat increased. On that afternoon the patient was again operated upon. The right sinus was further exposed without presenting any pathologic changes in its walls. The left mastoid process was opened and showed the same condition as in the right side. The antrum and the walls were filled with pus and granulations. The sinus was not exposed.

July 17th.—T. 37° .

July 18th.—T. 36.9° – 37° . After this the course was afebrile and convalescence was rapid.

The improvement in the general condition of the child after the second operation was very striking. While before the child was apathetic and sleepy, it later became so lively that it was difficult to keep it in bed.

Changes in the right sterno-clavicular joint disappeared in a few days.

I report this case because it shows in an excellent manner the clinical picture of the osteophlebitic pyæmia as described by Körner. The disease coming on after an attack of acute otitis during measles, the pyæmic fever, the metastases in the right sterno-clavicular joint, and the immediate cessation of the fever after operation on the left mastoid are characteristic. As aural suppuration and empyema of the mastoid process in small children are frequently associated with high fever, it might be stated that the case was not a pyæmic one. The repeated chills with temperature over 40° , the decline with profuse sweat, and the involvement of the sterno-clavicular joint, to my mind, belong only to severe pyæmia, and we must assume at first an involvement of the sinus. But exposure of the sinus and of its surrounding parts revealed no abnormality, and this is also confirmed by the subsequent course.

It is not my intention to stir up the old discussion about the existence of an osteophlebitic pyæmia, but, without wishing to belittle the services of Leutert in having ex-

plained the clinical and pathologic changes in otitic pyæmia. I must state it as my opinion that his theory, viz., that there is no pyæmia without sinus-thrombosis, cannot cover the many-sided clinical picture of otitic pyæmia. It is undoubtedly too schematic and should not attempt to explain all the clinical appearances of the various cases, though it has proved satisfactory and valuable in showing us the proper therapeutic measures. Continuous fever in the presence of an aural suppuration where there is free drainage from the tympanum indicates that the sinus should be exposed and opened. There surely can be no doubt about this point, though the absolute lack of danger of this step has not been accepted by all. Up to the present date there are three cases where exposure of the sinus has been followed by severe pyæmia. The first was observed in the Clinic at Halle (*A. f. O.*, xlix., p. 120). In a radical operation for cholesteatoma the normal sinus was exposed in the space of a bean. Normal course. The patient is discharged on the ninth day. One week later the temperature in the evening rose to 40.6° and the patient is re-admitted. Under continuous high temperature the elbow and knee joints became inflamed. On the sixth day death ensued. *Autopsy* showed that the sinus contained, in addition to blood coagula, a yellowish-brown parietal thrombus corresponding to that part of the sinus exposed at the operation. In the remarks, it is stated that a secondary infection during the after treatment cannot be excluded, though it is improbable, as such an occurrence had not been previously observed and the case was recorded and treated for one of articular rheumatism. The autopsy showed that it was an artificial sinus-thrombosis resulting from the operation.

Panse (*A. f. O.*, li., p. 23), after the publication of this case, related a similar case in which the sinus had also been exposed during a mastoid operation. Twelve days after the operation, chills. The sinus operation was performed a few days later and a purulent thrombosis was found. Death. According to Panse, the thrombus in this case was produced by the presence of a small collection of blood between the sulcus and the sinus. This became infected and the

perisinuous abscess led to destruction of the wall and to thrombosis.

The third case was observed in the Rostock Ear Clinic. During an operation after scarlet fever the sinus was inadvertently exposed. Twelve days later, the wall of the sinus was covered with granulations. After five days, the temperature rose to 40° without a chill. The granulations on the wall of the sinus did not show anything abnormal. On the following day the temperature was 40.1° . The jugular vein was ligated on account of suspected pulmonary metastasis. The sinus was exposed and incised and fluid blood evacuated. The clinical picture of pyæmia developed without chills but with high temperature and occasional pain in the various joints. After four weeks, normal temperature and recovery.

Körner explains this pyæmia from an irritation of the sinus by the introduction of gauze so that a parietal thrombus was caused, and he warns against exposing a normal sinus unnecessarily.

A fourth case can be added from my own Clinic.

CASE 2.—G. S., thirty-six years old, was operated upon July 16, 1902, on account of a chronic middle-ear suppuration with polypi and caries in the attic and antrum. During the operation the sinus was exposed. Normal course. At the second dressing, July 23d, the exposed sinus-wall showed beginning granulations. The patient was discharged for out-door treatment.

On the following day after a short walk he felt unwell, with headache, chills, and fever, which were repeated on the following day.

July 28th.—He was re-admitted to the Clinic. Temperature, 38.3° . He complains of very severe headache. Loss of appetite. On changing the dressing, there is found at the region of the exposed sinus-wall a small pulsating drop of pus. After cleansing, the sinus wall appears inflamed and red. Temperature, 39.6° .

July 29th.—Temperature, 36.3° – 39.8° . General condition poor. The headache is less. During dressing the perisinuous suppuration appears to have ceased.

July 30th.—T. 38° – 39.3° . No chills. Condition in general has improved.

August 3d.—T. 38° – 40.4° . A chill in the afternoon.

On the next two days there was some rise of temperature.

On August 10th, temperature 38° , and from this on an uninterrupted recovery. The patient remained in bed for about eight days and was discharged on the 21st. The patient subsequently again began to complain of pain in the occiput corresponding to the course of the sinus, which was unusually tender. He was again admitted, and on September 2d the sinus was exposed backwards expecting to find further pathologic changes. The sinus and the dura covering the cerebellum, however, were perfectly normal. No further fever. There have been no further disturbances.

In this case an inadvertent exposure of a very small portion of the sinus wall was followed by a pyæmia which fortunately did not lead to severe consequences.

Infection of the sinus in this case probably occurred through the packing on the sinus becoming infected, and thus a perisinuous abscess was formed, which led to a parietal thrombus. I think unquestionably a thrombus was present, on the evidence of the second attack of fever from which the patient suffered.

An extensive exposure and exploration of the sinus was surely indicated and would have been done but for the fact that the general condition of the man while in bed improved so rapidly that the chills did not recur and no metastases appeared. The subsequent exposure of the sinus did not give any clue for the cause of the severe pain in the occiput.

These cases in short show that we may have very unpleasant surprises from an innocent exposure of the sinus. It is worthy of note that in all cases the sinus was displaced and that the exposure was accidental. It is unquestionably proper that such cases should remain in bed at least fourteen days.

CASE 3.—G. M., four years old, suffered from scarlet fever in September. Complained of severe pain in the ear on the 8th of October, which was followed by otorrhœa and the pus was very soon fetid, a symptom which, according to the Ear Clinic in

Halle, is important prognostically as evidencing a severe course of an aural suppuration. Even before the otorrhœa, the left mastoid process had become swollen and fluctuated.

October 11th.—A feeble child in poor general condition in the period of desquamation. Urine contains no albumin. Both ears are filled with fetid pus. There is a large perforation in the drum on the left side. Periosteal abscess.

Operation.—After broad incision of the periosteal abscess and evacuation of the pus, the mastoid process is exposed and the cortex shows but little change. The bone is hard, the cells are filled with pus without marked pathological changes in the mucous membrane. It seemed as if a normal mastoid process had been filled with pus. The sinus was not exposed, as the condition in the mastoid process in connection with the remnants of scarlet fever explained sufficiently the clinical symptoms.

On the following days the general condition was satisfactory, but the fever persisted, and on the sixth day the right mastoid process was opened. The bone was found soft and hemorrhagic. The cells and antrum contained pus and granulations. During the dressing the peculiar dry condition of the left mastoid was noted. There was no evidence of any formation of granulations. The wound was of a dirty-white appearance—in other words, the bone was necrosing, and it became evident that another operation would be necessary. This, however, could not be undertaken on account of the poor condition of the child. Repeated evening rise of temperature. The child's condition did not get any better, and on October 27th the temperature rose to 40°, with a chill and collapse. On the following day it was decided to operate.

Oct. 28th.—A necrotic piece of bone was removed and the sinus was exposed. On opening the cranial cavity, a thick stream of fetid pus covered the field of operation, followed by profuse venous hemorrhage, which came from the ruptured sinus. The bleeding stopped on packing, and the sinus was freely exposed. Its wall and that of the surrounding dura were covered with unhealthy granulations and pus. The sinus wall was incised and soft thrombus masses were removed from its lumen, until another thick stream of blood appeared from the peripheral end.

Oct. 30th.—T. 38.5°–45°.

Oct. 31st.—T. 37.8°–40°.

Nov. 1st.—T. 37.1° – 38.4° . The wound was dressed and appeared very much cleaner. The peripheric part of the sinus was dry. There was some pus in the central part. Pressure on the soft parts of the neck forced thick pus out of the sinus. Some additional thrombus masses were removed with the curette.

Nov. 2d.—T. 37.5° – 40.5° .

Nov. 3d.—T. 39.5° – 37.7° . The jugular vein was ligated, though there were no pathological changes to be seen. At dressing, the central end of the sinus was found perfectly dry, and no more pus could be evacuated. In the evening, the temperature rose to 40.9° , and the child went into collapse. She recovered on the injection of camphor and doses of alcohol. The pulse was frequently not to be counted and generally very rapid, though uniform and of good force.

Nov. 8th.—T. 36.5° – 40.5° . At the dressing, the central part of the sinus opening was found closed. Considerable pus escaped from the peripheric opening. This was carefully irrigated and drained.

Nov. 10th.—The discharge of pus continued from the peripheric end. The bone in this region is removed, and the sinus is exposed up to the confluens. The dura everywhere is normal. The sinus is opened, and softened thrombus masses are removed, until free bleeding is established. The temperature slowly fell. The discharge from the sinus grew less.

On November 28th there was no suppuration from the sinus. The granulations in the wound were everywhere healthy, except at one part of the bone, which appeared necrotic. This was removed. The roof of the tympanum was also removed. The dura of the middle cranial fossa was found normal. The subsequent course was uneventful. The eyes were frequently examined, but always appeared healthy.

During the spells of fever, the general condition of the child was a deplorable one, with frequent attacks of collapse, which had to be treated energetically. In the period of normal temperature, the pulse was always very rapid (120–150), a probable evidence of toxæmia, but was never irregular. This action of the heart is probably responsible for the child's recovery. It seemed to me of considerable advantage to give enemas of salt solution, which were always followed by a great improvement in the general condition

of the patient and in increase in appetite. There was no diarrhœa.

Of special interest in the course of this disease, was the acute necrosis of the left mastoid, which became complete a few weeks after the beginning of the aural suppuration. This is always a sign that the constitution is very much weakened and that the resistance is lowered. It is nearly always only observed in the course of scarlet fever. There must, however, be some other reason why this necrosis takes place under these conditions, because there is no reason present why the left mastoid should become necrosed while the right presents the usual form found in empyema of the mastoid process. It may possibly be—leaving anatomical variations in the structure of the bone aside—due to a varying degree of virulence in the bacteria. The necrosis led to a perisinuous abscess, and this in turn to sinus thrombosis. The latter, with its unfortunate consequences, might have been prevented, if the bone had been removed down to the sinus at the first operation. This, however, did not seem to be called for.

At the time of the second operation, the thrombus of the sinus was not a complete one, as is shown by the rupture of the sinus and hemorrhage. These ruptures are not uncommon, and indicate an extensive disease or destruction of the sinus wall. The large perisinuous abscess had compressed the sinus. On the sudden evacuation of the pus, the diseased wall no longer withstood the pressure. A thrombus was already present. Complete removal of the thrombus mass was not possible, owing to the poor condition of the child. These thrombosed masses which remained probably caused the further suppurations in the sinus.

That the chills and the pyæmic fever should continue after the evacuation of the sinus and ligation of the jugular vein has been frequently observed, and has been interpreted in a variety of ways; that it is due to a previous dissemination of the infectious material into the body I cannot agree to, on account of the long period of fever and the absence of all metastatic inflammations. Occasional increase in respiration might be due to small metastases in the lungs, which

could not be detected. It is perfectly possible that the infectious material was transmitted by retrograde infection, viz., through the petrosal sinus and the vertebral vein. It is also possible that a thrombus existed in the jugular bulb.

I think it ought to be stated that the continued infection of the body might have been due to the bone remaining in the mastoid, which was filled with bacteria, and later began to necrose. The toxins absorbed by the blood produced the pyæmia in a similar manner as Ponfick and Brieger have shown in the case of nurslings, or an ordinary invasion of bacteria may have taken place. The pus in the blood was unfortunately not examined bacteriologically, as I had no hesitancy in regarding the streptococcus as the infectious agent. The course of the pyæmia, however, showed that the infection was not a very virulent one, and after the complete removal of the bone the attacks of fever and chills ceased.

REPORT OF THE THIRTEENTH MEETING OF
THE GERMAN OTOLOGICAL SOCIETY, MAY
20 AND 21, 1904, IN BERLIN.

BY DR. ARTHUR HARTMANN.

For the first time the Society met in Berlin. The meeting proved to be in every way a most successful one, as there were 57 papers announced, and 160 members present. The chief subject was the Anatomy of Deafmutism, introduced by Professor Siebenmann (Basel). This author treated congenital deafmutism only, of which he gave a very complete picture of our present knowledge, and reported a very interesting newly examined case, together with seven previously published.

In order to stimulate the investigation of the deaf-mute ear, a monograph on the Anatomy of Deafmutism is to be published by the Society, and the first part, which has just appeared, will be sent to all members.

The exhibition of specimens and apparatuses was unusually extensive and interesting.

The next meeting will be held in Homburg in the spring of next year. The subject for discussion will be the Deaf in the Schools, introduced by Drs. Hartmann and Passow.

The first paper was by

Dr. SIEBENMANN: Report on the anatomy of congenital deafmutism.

In regions poor or rich in cretins there are about equal numbers of individuals with congenital, as with acquired, deafmutism. On careful examination of the autopsy material, the striking result is reached that in only about one-tenth of the 180 deaf-mutes whose ears have been examined, deafmutism depends upon congenital changes. The perusal of a continuous and uniform series of autopsies of deaf-mutes shows that acquired deaf-

mutism does not come more rarely to autopsy than the congenital form, though the first shows generally changes limited to the membranous labyrinth, which in earlier years, when microscopic technique was not sufficiently well developed, were usually overlooked. In most of the autopsy reports published by Mygind of congenital deafmutism, changes in the labyrinth are described, which are unquestionably due to meningitis or to an inflammatory middle-ear process.

In 17 positive cases of congenital deafmutism, in one case bilateral total absence of the bony and membranous labyrinth was found, combined with absence of the greater part of the petrous pyramid. In the remaining 16 cases, deafmutism depended upon degeneration and arrests in development of the sensory epithelium and associative nerves. At the present time the following classes may be described:

I. Degeneration affects only the epithelium of the lamina spiralis membranacea (2 cases).

II. Degeneration affects the endo-lymphatic epithelium to a large extent or extends into the inferior region of the labyrinth. Together with metaplasia of the epithelium, the diseased membranous labyrinth undergoes an enlargement (ectasia, collapse). The 14 cases of this group may again be subdivided as follows:

1. A complex of changes, which was first described by the author, not limited to the labyrinth, but extending to the anvil and the labyrinth windows. The *Mt* is normal; the degeneration in the labyrinth restricted to the cochlea. The cochlear nerve with its ganglion mass is very well preserved. The two individuals belonging to this group presented distinct hearing remnants.

2. Mundini, at the end of last century, reported a variety of labyrinthine changes in deaf-mutes where the same changes were found in seven individuals. The ectasia affected principally the apex of the membranous cochlea and the aqueductus vestibuli. The internal framework of the cochlea, which consists of connective tissue and bone, was absent in the other half of the cochlea. Alexander (Vienna) has given us the histological examination of such a case.

3. Another anatomical variety of labyrinthine change in deaf-mutes Scheibe has described in two cases. Two additional cases have been reported by the author together with Oppikofer, and another by Katz. In all these cases, the ectasia was combined

with more or less pronounced folding of the walls of the sacculus and ductus cochlearis. The cases of familiar disease which have been observed, and of deafmutism which have been examined, belong to the second and third of these groups.

Dr. HABERMANN (Graz) reported upon **clinical and pathological examinations of cretins**. He was able to examine microscopically the ears of two cretins. In one the ganglion cells of the cochlear nerve were displaced, though they had not all advanced into the ganglion canal, and an arrested development of Corti's organ was present. The author is inclined to regard the case as one consecutive to inherited cretinism produced by the absence of the function in the thyroid gland of the mother during the first months of gestation. In the two cases the internal ear was healthy, but there existed a purulent middle-ear inflammation with its sequelæ.

Dr. SIEBENMANN (Bâle) described the **microscopic changes** which he had found **in the ears of a congenital deaf-mute**. They presented a very interesting condition. Moreover a short time before death a functional examination not only in relation to the auditory but also in relation to the static sense was undertaken. The individual was one of a deaf-mute family, consisting of three deaf-mutes, of whom one had already furnished a very interesting anatomical examination and report at a previous otological meeting. Just as in the latter case, the changes were limited to the membranous cochlea and to the round saccule of the vestibule. They consisted principally in an extended degeneration of the epithelium with distension and folding of the walls and atrophy of the cochlear nerve. Though not a single normal Corti's organ and not a single normal auditory cell were found in the cochlea, the deaf-mute person in question possessed in that ear in which the middle convolution of the cochlea was very well innervated, a sufficiently accurate understanding for vowel sounds. Of the eleven octaves of the perceptible tone scale, five could be heard. The ear on the other side was deaf to almost all sounds and to the tones of the seven octaves, as well as for all the tones from *b* downwards. The round saccule of the vestibule was the only one of the vestibular structures degenerated. The static function proved to be quite normal both in the rotating expression as well as for the sensation of vertigo and the rotating nystagmus. The neuro-epithelium in the ampulla and in the utriculus in both hearing organs is thoroughly in accord with this finding.

The latter condition of the ear is a support and a proof for the correctness of that view which gives to the superior part of the labyrinth chiefly a static and not an auditory function.

Dr. ALEXANDER (Vienna) reported on the **microscopic examination of the ear of a deaf-mute**, thirty-five years of age. In addition to other changes, there were bilateral atrophy (hypoplasia) of the eighth nerve in the trunk and branches and of all of the ganglia, atrophy of the static nerve, of the terminals of Corti's organs, and bilateral arrest of development of the capsules of the cochlea.

Dr. SCHWABACH (Berlin) reported on the **anatomical findings in six labyrinths of three deaf-mutes**. In the two first cases from the history it must be assumed that the deafness was acquired in the first years of life, though from the result of the histological examination it seems that there probably must have been a congenital defect caused by an arrest of development in the membranous labyrinth, associated with an atrophy of the spiral ganglia and an atrophy of those nerve fibres which pass from these ganglia between the two lamellæ of the spiral osseous lamina, and in the rudimentary development of Corti's organs. It is not possible to state whether the defect of the latter structures was caused by an atrophy of the spiral ganglion or the opposite.

In the third case the deafmutism was unquestionably acquired. The case was of one who had survived an attack of cerebro-spinal meningitis in the seventh year, which had led to the complete obliteration of the cochlea, with newly-formed bone-tissue on both sides and a peculiar new formation in the vestibule, also bilateral. This consisted principally in a convolution of medullated nerve fibres, presenting the picture which Virchow has described as an amputation-neuroma.

Dr. KATZ (Berlin) demonstrated a **specimen** from a case of **congenital** and from two cases of **acquired deafmutism**, from a deaf albinotic cat and from a dancing mouse.

Discussion.—HAMMERSCHLAG distinguishes between true congenital deafmutism and that acquired during uterine life. LUCEA is rather sceptical in regard to the results of hearing examinations in deaf-mutes, inasmuch as the sense of touch cannot be excluded. It is possible to have a reaction to sounds which are not heard. SIEBENMANN observed in a cretinic idiot different changes from those described by Habermann. HABERMANN

states that he was the first to recommend decalcification of the temporal bone in 5 per cent. nitric acid and to report on observations made on the examination of deaf-mute ears. ALEXANDER imbeds the specimens first in celloidin and then decalcifies them in 8-10 per cent. acid. KATZ reported upon the condition of the brain found in a case of deafmutism.

Dr. ALEXANDER (Vienna) reported on additional studies **on the ears of animals with congenital anomalies in the labyrinth**, and demonstrated some specimens. From numerous examinations of the ears of a dancing mouse, dancing-mice embryos and, cats, he describes the following groups: 1. A sacculo-cochlear degeneration. 2. Congenital atrophy of the auditory nerve. 3. Congenital anæmia of the labyrinth. 4. Congenital filling up of the cochlea with blood-vessels. 5. Atypic development of the papilla basilaris and of the peripheric Corti's organs.

This author then continued to speak on congenital deformities of the internal ear with demonstration of specimens from the embryo of a cat 11 mm long in which synotia was present.

Drs. FREY and HAMMERSCHLAG (Vienna) reported on **rotating experiments in deaf-mutes**. They came to the following conclusions:

1. In a deaf-mute reacting positively to the rotating experiment the intensity of the nystagmus shows a distinct dependence upon the increase in movement.

2. The rotating nystagmus is not a suitable differential point between congenital and acquired deafmutism, though its presence in the congenitally deaf is more frequent than in those becoming deaf later in life.

3. The deaf-mutes without hearing are not affected by rotation. The best hearing deaf-mutes show generally rotating vertigo.

Dr. HAMMERSCHLAG reported on the **relation between hereditary degenerative deafness and consanguinity of the parents**.

He has been able to show that a multiple appearance of hereditary deafness is a very suitable means to demonstrate the relation.

Dr. FREY (Vienna) reported on **experiments** which he had made **on deaf-mutes** in order to **test the intensity of the knee-jerk**. In a large number of cases a decided diminution of this symptom was present. The connection between the

result of this experiment and the theory of a labyrinth tonus is described.

Professor DENKER (Erlangen) reported that in the Bavarian Senate the following motion was passed for the further instruction of deaf-mutes :

"The favorable results which have been obtained for a number of years in Munich by the separate instruction of those inmates of institutions who possess sufficient hearing remnants have seemed to make it advisable that similar opportunities for instruction for those becoming deaf late in life and those still possessing speaking remnants should be given. They are to be collected in separate classes and instructed by a method in which the eye and the ear are equally employed ; and it would seem desirable that in the various institutions for deaf-mute children separate divisions should be formed for those with auditory remnants."

Thus it seems that at least in Bavaria the method introduced by Bezold and his friends of separate instruction for those deaf-mutes retaining sufficient hearing and speaking remnants is assured.

Dr. MANN (Dresden) has previously reported on the **mechanism of the movement of the blood in the internal jugular vein**. His observations were on a case of exposed bulb of the internal jugular vein in chronic purulent otitis media. If the patient rotated his head on the vertical axis towards the healthy side so that the sterno-mastoid muscle of the diseased side was almost in a vertical position, the exposed bulb exhibited distinct pulsation, while in every other position of the head it was quiet. He concluded from this that the pulsation in the internal jugular was a compensatory arrangement, inasmuch as on the other side of the skull the venous outflow is retarded in this position. The pulsation in this vertical sternocleido position extends into the sinus, as he was able to observe in a case where the sinus was exposed in a perisinuous abscess. By this means the presence of an obturating thrombus in an internal jugular vein can be demonstrated, and this explains the repeatedly observed air-embolism in injury to the sinus. Two patients were demonstrated to show this feature.

Dr. WINKLER (Bremen): on **operations on the mastoid process and opening of the antrum with consecutive meatoplasty**, with demonstration of patient.

In all simple mastoid cases the author removes the tip of the mastoid and the posterior bony wall, as the preservation of these parts is not essential to the future function of the ear. It is, however, important always to leave a bridge of the posterior bony canal wall in the neighborhood of the *Mt.* Aside from the fact that by this extension of the operation complete elimination of the mastoid cells is possible, the depressions and recesses beneath the auricle are avoided, which are so frequently present if the posterior auditory canal wall and the tip of the mastoid process be preserved. If the mastoid process is unusually broad, where the old method would often leave a very large defect in the bone which could later only be corrected by a larger plastic procedure, as well as in stenosis of the auditory canal or congenital stenosis or periostitis, a meatoplasty is made immediately after the operation on the bone. This consists in the incision and retraction of the membranous canal downwards, while the detached auricle is sutured to the posterior cutaneous wound. In this distended canal the discharge from the tympanum and antrum is collected by gauze slips. By this means the cavity remaining after a very extensive operation is very much reduced and heals in a similar manner to that after the plastic step in the radical operation. A case was presented which was reported on in 1901, in which though a very large bony cavity was present the depression behind the auricle is absent. If the mastoid operation in this case had been performed according to the old method, by preservation of the posterior bony wall, the large defect in the bone could only have been brought to cicatrization by the formation of cutaneous flaps. Winkler's method is therefore simpler and gives better cosmetic results.

Dr. WINKLER (Bremen) reported on the **osteoplastic exposure of the frontal sinus**, with demonstration of a patient.

This was a case which had been operated upon in the spring of 1902, on account of a severe suppuration in the left frontal sinus. The frontal sinus was exposed by the following method and healed. The method consists in a cutaneous incision made at the inner angle of the eye. From this the cutaneous flap is detached towards the eye. Then a flap consisting of the soft parts and bone, including the external wall of the nose and the anterior wall of the frontal sinus is formed and detached towards the middle line of the nose. The cutaneous and the bone incisions must not correspond with each other. This has the

advantage that after thorough eradication of the diseased accessory sinuses and after the reposition of the bony and cutaneous flaps, the bone flap is held in place. The cases in which this method is suitable present, in addition to a very small cutaneous scar, practically no deformity. As has previously been stated, the author is of opinion that there is no universal operation for the surgical exposure of the frontal sinuses. It is difficult to adopt the correct operative plan in each case. This is determined: (1) by the diseased process, (2) by the varying shape of the nasal skeleton as well as of the frontal and ethmoidal cavities, (3) by the fact that the operation is performed on the face and later cosmetic results must be kept in mind.

The study with Röntgen plates of the sinus to be operated upon is of great value. The author refers to his publication in the *Journal* on the "Röntgenstrahlen," vols. v. and vi. Since 1899 the author has performed this operation six times in twenty-five operations on the frontal sinus. Essential for this operation is a healthy and unaffected bony wall, the soft parts must not be inflamed, there must be no cerebral or ocular symptoms. The X-ray picture must show: 1. Those landmarks necessary for the osteoplastic operation, consisting in: (a) thin anterior plate of bone in the frontal bone, (b) deep and high frontal sinus, (c) relatively moderate development of the orbital ethmoid cells. 2. The special points in his method, consisting in: (a) a thick condition of the frontal process of the superior maxilla, (b) a thick floor of the frontal sinus. In the two latter cases the operation proposed by Barth in Danzig should not be recommended. Finally the indications are given for performing Riedel's radical operation with the removal of the orbital bridge, and the improvement on this operation instituted by Killian with preservation of the orbital bridge.

Discussion.—JANSEN (Berlin) thought that in the method advocated by the speaker adhesions, cicatricial bands, and the formation of membranes easily developed in the region of the aditus which retarded healing. In regard to the operation on the frontal sinus, he had also obtained very good results in very large cavities by operating according to Killian's method with a flap composed of skin and periosteum from the anterior wall. If the mucous membrane is very much swollen and polypi are present, recovery is more rapid than when the mucous membrane is but slightly thickened and there is but slight discharge. According

to BRIEGER (Breslau), the osteoplastic operation in the frontal sinus is only for the purpose of more quickly and better obliterating the cavity. After the operation no lumen remains. GERBER (Königsberg) thinks that in cases with changes in the bony walls, with fistula and so forth, it is better to operate according to the old method. HOFFMANN (Dresden) makes use of the bone flap with the adherent skin and periosteum only when the walls are unusually thick. HEINE (Berlin) thinks that it is not proper to remove the posterior auditory wall if it is healthy. VON EICKEN states that the depression following Killian's method is not of any importance. It can at any time be corrected by the injection of paraffin. RITTER (Berlin) thinks a very broad bridge of bone is of great importance.

Dr. HINSBERG (Breslau) presented a patient on whom the Luc operation had been performed on account of a suppuration of the maxillary antrum. After recovery, on masticating, a clear fluid, saliva, poured out of the nose. There was evidently a **fistula of an abnormal Steno's duct**. On making an incision directly through the cheek the duct was exposed and divided directly in front of its opening. A part of it was made movable and transposed about 2cm farther down and brought through a new opening made in the mucous membrane. Recovery.

Dr. DENKER (Erlangen) reported on his investigations on the **Eustachian tube of the ant-eater**. The most important results of these examinations, which have shown that a Eustachian tube exists in this *Myrmecophaga didactyla*, are as follows:

1. The tube of this *Myrmecophaga didactyla* is not drawn out into a sheath-like tube, but represents a broad cavity surrounded by membranous walls.

2. In place of a bony tube, there is a round opening at the posterior and inferior corner of the tympanum to which the membranous tube is attached.

3. This opening in the *Myrmecophaga jubata* is surrounded anteriorly by the tympanum and partly by the pterygoid, posteriorly by a process of the basilar occipital.

4. The epithelium of the tube of the *Myrmecophaga didactyla* is a cylindrical epithelium possessing cilia which become somewhat flattened as it approaches the tympanic opening.

5. The layer of fibrous connective-tissue situated beneath the epithelium is surrounded by a thick layer of acinous glands which partly empty into the tubal lumen.

6. At a greater distance, the Eustachian tube is surrounded by three strongly developed muscles, of which one is situated in the frontal plane, surrounding the tube on the posterior and on the lateral sides. The other two are situated on the ventral side and extend occipito-orally.

Dr. ZIMMERMANN (Dresden) reported on **investigations on sound transmission in the ear.**

This was discussed by Drs. Kayser, Panse, Dennert, Vohsen, Frey, Lucae.

Dr. OSTMANN (Marburg) reported (1) on the sensitive curve of the normal ear as a measure for the sensitiveness of the deaf ear on the basis of an objective-hearing measure; (2) on the extension of his table of hearing tests in the deaf ear on the basis of the objective-hearing measure; and he demonstrated (3) a new C-fork series as a universally applicable objective-hearing measure.

Discussion.—PANSE believes that frequently cerumen produces an involvement of the labyrinth on account of the presence of high-pitched tinnitus. BLOCH states that the duration of vibration of tuning-forks varies after use. DENKER has had the same experience. VOHSEN finds that the sound which is made by the tuning-fork stretcher is very annoying. LUCAE objects to the term objective-hearing measure, as the examination depends considerably on subjective conditions. OSTMANN emphasizes the fact that tuning-forks must be firmly mounted. If the ear of the examiner no longer possesses the normal-hearing duration, the difference must be determined and taken into account.

Dr. QUIX (Utrecht) spoke on the **determination of hearing with the aid of tuning-forks.** He has had forks constructed on which are engraved the values for the commencing amplitude, the decrement, and the normal-hearing duration. In the examination the number of seconds must be determined for which the patient hears the sound, then the hearing acuity can be determined from the tuning-fork.

Dr. GÖRKE (Breslau). The pathological significance of **middle-ear exudates found at autopsies.**

In a systematic number of autopsies the author found in many adults collections of purulent exudate in the middle ear with an intact drum. These have not the significance of an associated appearance of specific diseases, as they are also present in cases which have nothing to do with otitis media. They are, moreover,

much more probably the result of the activity of the usual pyogenic organisms which become in the last years of life virulent, when the powers of resistance of the organisms diminish and the normal protecting mechanism is interfered with. In these cases of otitis with normal drums, there may be a necrotic process in the mucous membrane, the bone may become partially absorbed, the labyrinth involved, an extension of the suppuration to the medulla may take place or to the jugular bulb, and so forth. At the same time attempts at organization may occur in the exudates.

Discussion.—PIFFL (Prag) believes that in these cases the exudate is absorbed of itself, so that it is not necessary to do anything. KOBRAK found in three cases of otitis media produced by the pneumococcus the presence of agglutinating powers.

Dr. FRIEDRICH (Kiel). **Can broad operative opening of the spinal canal be of therapeutic value in certain cases of purulent cerebro-spinal meningitis?**

Discussion.—BRIEGER believes from his experience that any expectation that we may have of doing good by operating in purulent meningitis should be given up. KRETSCHMANN is of the same view. It is impossible to remove the exudate, and it seems very much more reasonable to expect something from serum-therapy to paralyze the toxic substances. PANSE states that notwithstanding sure proof of the presence of purulent meningitis, recovery can take place, so that our therapeutic endeavors are indicated.

Dr. STENGER (Königsberg) reported on investigations on the **development of otitic sinus thrombosis.**

Dr. BLOCH (Freiburg) on **dysthyric deafness.**

Just as there is a form of deafmutism which is a form of dysthyreosis, a similar but less pronounced expression of the influence of this dyscrasia on the hearing organ may produce dysthyric deafness. In clear cases this is a nervous deafness with all its attributes, and in the severe forms is associated with disturbances of speech. The most frequent clinical signs of dysthyreosis are struma, struma in the family, infantilism, adiposity, enlargement of the pharyngeal tonsil, defects of intelligence, nervous defects in the family.

The corresponding treatment of the disturbances of hearing brings only rarely rapid results. As a rule the treatment must be prolonged for years.

Dr. KOBRACK (Breslau) on infections after removal of the pharyngeal tonsil.

In over 100 operations, 38 slight general disturbances were observed; 2 presented unusually severe septic infection, with 1 fatal case.

Prophylactically it is necessary to watch for the manifest and latent sources of infection (scarlet-fever, diphtheria, etc.). Strict asepsis is, of course, necessary.

Discussion.—THOST (Hamburg) drew attention to the swelling of the cervical glands in the presence of pharyngeal tonsils. If the infection is a recent one, the glands are swollen, tense, round, and sensitive. In such cases the operation should be postponed.

Dr. SCHÖNEMANN (Bern) demonstrated a model of the human ear for use with a projection apparatus.

Dr. SCHEIBE (Munich) spoke on the pathogenesis of the empyema following acute otitis media.

Specimens were presented by Drs. KATZ (Berlin), ALEXANDER (Vienna), MANASSE (Strassburg). The last author demonstrated three cases of primary endothelioma of the middle ear and of the petrous pyramid.

Dr. JENS (Hanover) demonstrated an **unusually enlarged and bony middle terminal** which was removed at operation. It measured $4\frac{1}{2}$ cm high, $7\frac{1}{2}$ cm long, and weighed 80 g.

Dr. KRETSCHMANN (Magdeburg) demonstrated a number of instruments: A palatal hook which differed from the usual models in that the straight handle which carries the hook which is supposed to grasp the uvula and soft palate is replaced by a handle which fits into the cavity of the hard palate, whereby less room is occupied in the mouth.

A tone depressor for autoscopy, where the mouth part describes a curve like a bayonet.

A tonsillotome with small forceps which grasp the tonsil and place it on the level of the tonsillotome.

Dr. KOBEL (Stuttgart) reported upon an **otitic brain abscess of the temporal lobe healed by operation.**

The question whether a brain abscess should be operated upon in a terminal stage is still open.

A child, eight years of age, of a tuberculous family, had suffered for a year and a half from a left-sided purulent otitis which apparently followed mumps.

On January 9, 1904, unconsciousness, with convulsions in the

right half of the face, arms, and legs, suddenly set in. At operation an extradural abscess was found in the floor of the middle cranial fossa, which was followed by improvement in the patient's condition. Eight days later again complete unconsciousness, which was preceded by a headache for two days.

At operation an abscess was evacuated from the left temporal lobe without any anæsthetic, as the child was in deep coma. Recovery after two months.

The case is of interest from three directions :

1. Because operation was performed on a patient where coma had existed for twelve hours, apparently in the terminal stage of a brain abscess.

2. On account of the depth and size of the abscess. The abscess must have extended well towards the lateral wall of the left lateral ventricle. The probe passed directly up in front for 9 cm in the abscess cavity; a rupture into the ventricle was, therefore, imminent.

3. On account of the complete recovery without any disturbance of function.

The case shows that the operation for otitic brain abscess can be successfully carried out even after the onset of the terminal stage.

Dr. ALT (Vienna) spoke on the **relation between suppuration of the middle ear and epidemic and tuberculous meningitis**. Purulent inflammations in the labyrinth are not uncommon in tuberculous and in cerebro-spinal meningitis where the process may extend to the middle ear. In both cases the infection may take place from the naso-pharynx. The author presented some specimens of this kind.

Discussion.—VON EICKEN (Freiburg) has published two cases, and has arrived at the same conclusion.

Dr. WANNER (Munich): **Investigations on schools for feeble-minded children in Munich.**

Of thirty-nine children (twenty-two boys and seventeen girls), twenty-seven, or 69.1 %, were more or less deaf. These children belonged to five schools and represented about 0.5 % of the number of pupils who were debarred from instruction on account of feeble-mindedness.

Fourteen children (that is, 35.9 % of those found in the class of feeble-minded, or 51.8 % of those found deaf in these schools) were so deaf that they belonged to a deaf-mute institute, or at

least should be instructed according to the instruction for deaf-mutes.

A comparison of the graphic reports of the hearing of deaf-mutes in the hearing classes and those who are supposed to be weak-minded shows that 50-60 %—that is, half—of the normal hearing value for speech must be necessary for the children to follow the ordinary instruction in the public schools.

The speech of these children was correspondingly affected to the degree of deafness. Two very deaf children did not speak at all. Four were unable to speak at the time of entrance. Thirty-three and three tenths per cent. of all the children spoke correctly.

In addition to these 69.1 % deaf, there were 10.2 % children who were unable on account of defective hearing to follow the instruction in the ordinary classes, so that really the weak-minded were 20.7 %.

It is therefore very important that the schools for the weak-minded should be divided into schools for those who are deaf and those who are really feeble-minded.

Instruction in the classes for the deaf must be given by teachers who are conversant with the methods of instruction for deaf-mutes.

Dr. RUDOLF PANSE (Dresden) recommended a number of **simple experiments** which are of considerable importance.

1. To show that the ossicular chain cannot transmit any sounds, it is always stated that the articulations interfere with the vibrations, or that they dampen the sound too much. If both ears are closed with wax or moist cotton in a quiet room, a tuning-fork having been struck, say small *c*, and taken in the hand, the sound will be distinctly heard in each contraction of the muscles of the arm and of the hand, notwithstanding that numerous articulations intervene between the hand and the labyrinth, many more than between the drum and the labyrinth.

2. The hidden position of the round window is advanced to show the impossibility of transmission of sound. If the entire inner ear is removed in a temporal bone so that the windows are exposed internally and the drum and membrane of the round window is perforated, it is perfectly easy to hear with an auscultation tube fitted with a thin glass tube which fits into the round window. The interference and weakening of the sound waves by reflection are therefore very slight.

Dr. VON EICKEN (Freiburg) on local anæsthesia of the external auditory canal.

On injecting a 0.5 % solution of cocain with a proportional amount of adrenalin, it is possible to anæsthetize the various nerve trunks in the auditory canal and to render it absolutely anæsthetic for operations. The nerves in question are the auricular branch of the vagus and the auditory-canal branches of the auriculo-temporal nerve which enter at the junction between the cartilaginous and the bony canal.

Both nerves can be attained by one point of injection at the posterior attachment of the auricle at about the upper level of the bony canal wall. The auricular branch of the vagus is attained on directing the needle towards the tympano-mastoidal fissure in a direction backwards and upwards. The auditory canal branches of the auriculo-temporal nerve are reached by passing the needle internally and somewhat anteriorly, with the patient's mouth wide open, to about $1\frac{1}{2}$ cm deep.

The skin is previously anæsthetized by chloride-of-ethyl spray. Pain is thereby avoided, especially if on advancing the needle some of the solution is injected into the surrounding tissues.

The anæsthesia becomes complete after a number of minutes so that even furuncles may be opened without pain.

Accidents can be excluded especially as the facial nerve is entirely outside of the region operated upon.

REPORT OF THE TRANSACTIONS OF THE SECTION ON OTOTOLOGY OF THE NEW YORK ACADEMY OF MEDICINE.

MEETING OF OCTOBER 13, 1904. DR. HERMAN KNAPP, THE PRESIDENT, IN THE CHAIR.

Presentation of Patients.

Dr. W. H. HASKINS presented a patient upon whom he had operated for **chronic purulent otitis with retention symptoms**. The patient, a woman twenty-three years of age, almost absolutely deaf, with otorrhœa for nine years, had suffered from pain for the last eighteen months. The pain in the ear recently has become worse, and there is facial paralysis. She was admitted to the hospital on September 10, 1904, with a temperature of 102°, pulse rapid and feeble. The auditory canal was obstructed by a polyp. Functional examination revealed practically no hearing. At *operation*, September 13th, the cortex of the mastoid was sclerosed, and the antrum contained pus, which was under considerable pressure. There was a defect in the tegmen tympani and the inner end of the floor of the bony canal was necrotic, so that after removal of this loose piece of bone the facial canal was found exposed. The disease had also extended to the tip of the mastoid and had laid bare the sinus. The tip of the mastoid contained pus. A meato-plasty was done and the posterior wound was left open. One week later, under ether skin grafts were inserted and the posterior wound closed. The subsequent course of the case was uneventful. The wound in the interior is not quite healed; the facial paralysis persists. In the left ear there is a perforation in Shrapnell's membrane. This case is interesting on account of the possible connection with a tuberculous focus in the lungs, the right apex being dull.

Discussion.—Dr. MCKERNON thought this case illustrated the danger of allowing any chronic otorrhœa to go without operation after dead bone had been diagnosticated.

Dr. HARRIS thought that the tuberculous feature in this case was one of great interest. In the tuberculous cases the necrosis is apparently external to the labyrinthine wall. The cases which he had observed had been characterized by excruciating pain and otorrhœa.

Dr. PHILLIPS thought that in every case where tuberculosis was suspected very careful search should be made for definite proof. He had found this proof to be extremely difficult to obtain from examination of the discharge.

Presentation of Specimens.

Dr. HASKINS presented **two foreign bodies** which had been **in the ears** of an old man of eighty years of age for six months without causing any symptoms. They proved to be the artificial ear-drums made of rubber which are so extensively advertised.

Dr. ALDERTON demonstrated a **temporal bone** showing an **anomaly of the jugular fossa**. The jugular bulb extended unusually far up and considerably to the inner side of its normal position, so that it rose to a level above the floor of the tympanum and was only separated from the posterior cerebral fossa by a thin plate of bone directly external to the internal auditory meatus.

The paper of the evening was **some points respecting the surgical anatomy of the facial nerve**, by HENRY A. ALDERTON, M.D., of Brooklyn, published in full, see page 471 of this issue.

Discussion.—Dr. PHILLIPS thanked the author for his extremely interesting paper, and stated that there was very little for him to add except the general rules which he had found of service for avoiding injury to the facial nerve in operating. He thought (1) that with the proper direction the operator could proceed with chiselling up to 15mm, and (2) the important landmark for him was the floor of the aditus—everything above the level of this structure could be removed with impunity. He also recommended the use of the Stacke protector for operators of limited experience.

Dr. BERENS presented a very remarkable temporal bone show-

ing an unusually oblique course of the facial nerve in its descending portion. The specimen was demonstrated at the last meeting of the American Otological Society, and a photograph of this interesting anomaly will be found in the Transactions. He took exception with Dr. Phillips and thought that our important landmark in avoiding the facial nerve was the external semicircular canal. He also did not think it right that the fact that there is but one normal course for the facial nerve should be impressed upon students, as, he said, unquestionably abnormalities occur, and it is very much better to err on the side of over-caution.

Dr. ARNOLD KNAPP demonstrated two temporal bones, one showing the usual vertical course of the descending portion of the facial nerve, while the other presented the so-called oblique course. In regard to what Dr. Alderton had said about avoiding the facial nerve in the radical operation, he thought that the Stacke protector had been practically abandoned by all operators. The field of operation is small enough. He thought that the dangerous part of the facial nerve was not the part at the level of the floor of the aditus, but the part below this, and that it was very important, especially in cases where there was disease in the posterior area of the tympanic cavity—the so-called sinus tympani (Steinbrügge),—that every bit of overhanging bone which represents the innermost margin of the posterior auditory-canal wall should be removed, and it is of course in this part of the operation that the facial nerve is approached the nearest.

Dr. MCKERNON thought that unquestionably anomalies in the course of the facial nerve occurred, and he did not favor the use of the Stacke protector. He also considered the danger of injury to the facial nerve to be greatest at the level of the floor of the aditus.

Dr. DENCH said there could be no question but that the external semicircular canal is our most important landmark. He is, however, of the opinion that the nerve is most frequently injured in its horizontal course, viz., along the inner wall of the tympanum, where the dehiscences most frequently occur.

Dr. Dench also spoke of the facial paralysis which came on subsequent to operation. He had observed it a number of times, especially after the grafting operation, when he thought that too tight packing within the tympanum was responsible. In the other cases, the cause of paralysis must be found in injury to

the chorda-tympani nerve, resulting in a hemorrhage within the facial canal,—or in some cases an infectious neuritis may be present. He thought that caution with regard to injury to the facial nerve might be overdone and not sufficient bone removed to eradicate all disease. He was also of the opinion that a most important step was the trimming down of the remnant of the posterior bony-canal wall.

Dr. MEIERHOF wished to state in defence of the Stacke protector that this instrument was originally devised by Stacke for his intratympanic method of operating, and that later, when the operation was further developed by Zaufal and others, the use of the protector was no longer needed.

Dr. BRANDEGEE spoke of a radical operation which he had recently performed for cholesteatoma, during which twitching occurred upon curetting, but no paralysis followed. A second operation four days later was done for the purpose of inserting skin grafts. Twitching was again noted. Facial paralysis came on forty-eight hours after this second operation.

Dr. LEDERMANN thought that it was very important that a patient, before the radical operation, should be informed of the possibility of subsequent facial paralysis, which of course in most cases was only temporary.

Dr. KERRISON had been very much interested in the paper of the evening, especially in regard to the measurements which were quoted. He had himself made a large number of measurements, and had found that the distance between the mastoid cortex, just posterior to the suprameatal spine and the aditus, rarely exceeded 12mm and was often very much less. He therefore thought that Dr. Phillips's statement that 15mm was a safe distance was not quite correct.

Dr. HERMAN KNAPP thought that in the experience of every operator facial paralysis had occurred, and, if the matter should come into court, he would express his opinion that the mishap was due to a technical fault, unfortunate, of course, but one that exceptionally might happen to any one.

REPORT ON THE PROGRESS IN OTOLOGY DURING THE FOURTH QUARTER OF THE YEAR 1903.

By DR. ARTHUR HARTMANN.

Translated by Dr. ARNOLD KNAPP.

ANATOMY.

389. **Eschweiler.** On the development of the sound-conducting apparatus, with a special regard to the tensor-tympani muscle with four plates and six figures in the text. *Arch. f. Mikr. Anat. u. Entwicklungsgesch.*, vol. lxiii., pp. 150-196.

390. **Baum and Kirsten.** Comparative anatomical investigations on the aural muscles of various vertebrates. *Anatom. Anzeiger*, vol. xxiv., 1903.

391. **Weigner.** Experimental investigation on the question of the central course of the cochlear nerve in the *Spermophilus citillus*. *Arch. f. Mikr. Anat. u. Entwicklungsgesch.*, vol. lxii., pp. 251-262.

392. **Le Double.** Two points on the pathological anatomy of the bony auditory canal. *La presse oto-laryngologique Belge*, 1903, vol. ii.

389. **ESCHWEILER.**—The author has endeavored to study the development of the tensor-tympani muscle from its first position up to the stage where it attains the differentiated shape. The material was furnished by the embryos of seven pigs from 10.5 to 53mm long. The result was that in the primitive condition an intimate relationship exists between the tensor-tympani muscle and the muscles of mastication, and that of the separation, and this connection takes place at a time when no muscular elements are present in the tympanic tensor. As soon as the blastemic position of the tensor is finally fixed, the muscular elements develop. The course of the development is such that the parts of the first branchial arches, situated orally, first develop into a definite form, while the area of the blastema which is situated aborally still remains in its primitive condition.

This is especially well seen in Meckel's cartilage. Even when the masticating muscles are well differentiated, the tensor-tympani muscle is still in its primitive condition, and then spreads from the muscles of mastication. As soon as it has reached its position, the formation of the muscular elements takes place in an inverted direction, namely, aborally to orally. The attachment of the muscles to the labyrinthine capsule takes place secondarily; in the embryo of 53 mm , the attachment of the muscular fibres to the labyrinth is to be seen. In the later or more developed periods, the connecting membrane which binds the muscle of the hammer and the masticating muscles is visible, namely, the tensor of the soft palate and its connective-tissue prolongation into the tympanum up to the belly of the tensor muscle.

Serial sections, moreover, show that the course of the chorda tympani as we are accustomed to see it in the grown-up animal appears secondarily. In the youngest embryos the chorda runs directly from the nerve of the second branchial arch to the tongue. It is prolonged aborally through the development of the blastemic pillar of the first branchial arch in the above described manner. Thus it leaves the facial nerve later at an acute angle, and its course approaches Meckel's cartilage and the lingual nerve.

AUTHOR'S ABSTRACT.

390. The muscles of the following animals were examined—horse, donkey, ox, sheep, goat, pig, dog, cat, and rabbit, and it was found that in each case a group of muscles corresponds to the solitary muscle in man. It is evident that in the higher development of the animal kingdom a reduction or simple amalgamation of the aural muscles occurs, which is so advanced in man as to almost reach the point where motility is entirely absent. A number of good illustrations are added. ESCHWEILER.

391. As this exhaustive paper is prepared in Bohemian and is consequently lost for science, the author has given a short résumé in the German tongue. In the zizel, the cochlea which projects freely into the tympanic bulla was destroyed partly mechanically and partly by the action of nitric acid, and then the degeneration of the nerve was studied according to Marchi or Busch. The following are the most important of the conclusions: The cochlear nerve spreads out in the ventral nucleus and in the auditory tubercle, which may be regarded as the ending of its first stage; from these gray masses the dorsal and ventral tracts originate;

the striæ acusticæ belong to the dorsal tract, differing from the striæ medullares of man; the ventral tract is much larger, especially the trapezoid body. The degeneration extended beyond the primary neuron, which the author explains from trophic disturbances.

ESCHWEILER.

392. I. The external opening of the bony part of the external auditory canal in the Yuwzäne skulls is either elliptic with a horizontal axis (75.1 %) or round (13.6 %), or elliptic with vertical or oblique axis (1.8 %). This third—the rarest—form in the Yuwzäne appears unequally more frequent in the American races and most frequent in the races where the skulls were formerly artificially deformed, or where this is still now being done.

II. In 8.5 % of American skulls (artificially deformed and normal), exostoses were present in the external auditory canal. The next in frequency in exostoses are the Australians, the South Sea Islanders, then the Egyptians, the African negroes, the Asiatics, and finally the Yuwzänes, with 1.03 %. The causes of the exostoses, just as the form of the external opening of the bony part of the external auditory canal, remain obscure.

BRANDT.

PHYSIOLOGY.

393. **Schaefer and Guttman.** On the differential perception for simultaneous tones. *Zeitschr. f. Psychol. u. Physiol. der Sinnesorgane*, vol. xxxiii., p. 87.

394. **Frey.** Further investigations on sound conduction in the skull. *Zeitschr. f. Psychol. u. Physiol. der Sinnesorgane*, vol. xxxiii., p. 355.

395. **Exner and Pollak.** On the resonance theory of sound perception. *Zeitschr. f. Psychol. u. Physiol. der Sinnesorgane*, vol. xxxii., p. 305.

396. **Fetzer.** On the resistance of sounds, especially vocal sounds, against harmful influences. *Pflüger's Arch.*, vol. c., p. 298.

397. **Emanuel.** On the action of the labyrinth and of the thalamus opticus on the attraction curve of the frog. *Pflüger's Arch.*, vol. xcix., p. 363.

398. **Exner.** On the clang-tint of the voice. *Centralblatt f. Physiol.*, 1903, p. 488.

399. **Moeller.** Remarks on the paper of Professor A. Barth on deceptions of hearing from pitch and clang-tint. *A. f. O.*, vol. lviii., p. 211.

393. Though the question of qualitative differentiation of individual successive sounds has been frequently and carefully studied, the differential perception for simultaneous sounds has not received so much attention.

The authors have first experimented with Edelmann's forks.

They found that for g^1 , d^2 , and g^2 about 12-15 vibrations is the minimum of the difference in pitch in which the distinction can be made. The rapid irregular dying out of the sounds and the difficulty of always striking the forks equally hard proved to be very disturbing. In the sound measure of Appun (vibrating metal branches), the overtones were disturbing. The experiments were more successful with the sound variator of Stern. The four tables which accompany the paper, giving the observations of four musical observers practised in psychophysics observation, showed that the absolute differential perception for simultaneous sounds is decidedly less than for successive ones. In the middle part of the musical scale, the limits were found to be in a difference of pitch of from 10-20 vibrations. In the once-marked octave, the differential perception appeared to be the greatest.

Lower down there was a distinct increase of the threshold. The observations, however, for the deep tones are unreliable, on account of their weakness. Of the once-marked octave up to d^2 , the perception does not show a decided tendency to decrease. Farther up this tendency comes on more rapidly.

In the opinion of the reviewer, it would be extremely important to remember these interesting observations belonging to physiology of the hearing in the examination of cases of diplacusis dysharmonica.

DREYFUSS.

394. The present paper is, in a certain sense, a correction of one previously published in the above-mentioned journal and reviewed in this magazine.

At that time FREY believed that the phenomenon that the sounds of a tuning-fork screwed into the auditory canal of a macerated skull were heard more intensely in the petrous pyramid of the opposite side was due to the fact that the pyramids represented the most compact bony structures in the skull.

In the present experiments, the tuning-fork was attached to the occiput, somewhat below the lambda fontanelle in the median line, and it was found that the highest intensity, even higher than at any other place,—in fact, higher than in the immediate neighborhood of the source of the sound,—was situated at that point, about 2.5 cm above the glabella, so that the point from which the sound originated was diametrically opposite.

It is therefore a peculiarity of the skull that sound originating in the pyramid, or in the occiput, causes the diametrically

opposite part of the skull to vibrate most intensely. The intervening points are less affected. In general the sound is less marked in the plane at right angles to the course of the sound. The results were the same even when the microphone was placed vertically to the surface of the skull and parallel to the surface in a trephined skull.

395. The experiments endeavored to test whether the mechanical processes taking place in the hearing of sound possess the characteristics which are peculiar to the physical appearances of covibration. The order of experimentation which was made cannot be described without giving the illustrations, and must be looked up and studied in the original. The results are in accordance with Helmholtz's covibratory theory.

1. The transposition recurring periodically in a tone-wave of half a wave length produces a sensation which cannot be differentiated from that produced by vibrations.

2. A sound-wave in which these transpositions occur with sufficient frequency produces a sensation of tone of less intensity than that sound-wave does, if it is free from all phase-transpositions.

3. The auditory impression produced by a sound-wave with these phase-transpositions grows less in its intensity, not only when the elongations of its vibrations become smaller, but also when the number of vibrations increases in the time unit.

4. This diminution of intensity can go on to the obliteration of the sound.

DREYFUSS.

396. This paper, of extreme interest to the aurist, is a continuation of the well-known experiments of Oscar Wolf on the differences in sound intensity of the various vocal tones. It is a well-known fact, which we observe every day, that on the approach of a band we can hear the deep instruments at quite a distance, while we are not at all struck by the intensity of those sounds in our proximity. On the contrary, our ear is attracted most by the high-pitched instruments.

The experiments of the author consisted in:

A. *Diminution of the vocal sounds by the atmosphere.* It was first determined at what distance the sound of certain sung vowels could still be heard, and in which way the character of the vowel was altered by air. It was seen that of equally and loudly sung vowels A had the greatest resistance; then came O, E, I, and finally U. Even in distances in which the subjective

pitch of the sung vowels was not nearly reduced to the threshold value, when the sound could still be heard, the vowel character was distinctly interfered with, either by the resonance of the increased harmonic overtones or the independent mouth tones of a harmonic or inharmonic nature. A single exception was A. The order of resistance of the others was O, E, I, U.

B. *Diminution of the vocal pitch through solid objects and air.* The experiments in the above paragraph had been made on the street, and for these experiments a number of rooms in the Physiological Institute were selected. The doors were closed and covered with drapery. The results were the same.

C. *Diminution of pitch through porous media and through air.* The instrument was a violin. The order of investigation should be read in the original. It was also seen that the deep sounds of the violin could be heard at a greater distance than the high ones, which means that if the distance between the hearer and the player remains the same, the scale which is played with the same subjective force ascending from g of the g string up to g of the e string is perceived by the hearer in the form of a uniform decrescendo.

D. *Diminution of the vocal sounds through porous media and through air.* The same results were here obtained as in the experiments in air. In other words, the resistance of the vowel A is greatest, and the order of the others is O, E, I, U.

E. Experiments on the relation of the pitch (objective energy) and the intensity (subjective perception) from clang-tints. This must also be read in the original.

DREYFUSS.

397. The author noted the attraction curve of the legs of a frog, vertically suspended, upon a pendulum kymograph of Fick-Helmholtz. It was found that there were differences in the curve of the normal animal and of the animal deprived of its brain and spinal cord. The first is spoken of as the tonus curve, the latter as the "corpse" curve. After destruction of both labyrinths the "corpse" curve appears. In a destruction of one labyrinth, both legs gave a middle position between the tonus and "corpse" curve. The central nervous system was then removed in layers. The removal of the cerebrum increases the reflex, but on removal of the thalamus opticus the "corpse" curve appeared. It can practically be assumed that in the frog the paths leading from the end apparatus of the eighth nerve to the spinal cord must pass through the thalamus opticus.

DREYFUSS.

398. The peculiar observation that we may recognize the voices of our friends from the phonograph though our own voice sounds foreign, leads to the assumption that we hear our own voice through life differently—in other words, with a different clang-tint than that with which it is heard by others. The most probable explanation for this change in pitch is that the speaker does not perceive his own voice only through the air, but also through that part of the body intervening between the organs of speech and the cochlea.

EXNER has shown by a simple experiment that the kind and shape of the conducting substance has an influence on the clang-tint, which was of course previously known. The piece of wood is held between the teeth of the one intoning, and this is grasped by both hands. The observer from time to time takes the other end in his mouth and closes both his ears. If the extremity is tightly grasped with the teeth, the sound of the singer will seem quite different to observers than when the tones are only perceived with the ear closed and without contact with the teeth. Instead of grasping the wood with the teeth the observer may place the end on the skin over the thyroid cartilage.

DREYFUSS.

399. MOELLER after experiments on singers and on his own person comes to a conclusion contrary to Barth in the well-known physiological vocal experiment of Spies, which consists in humming a tune with closed lips. The sound becomes deeper on closing one half of the nose—and agrees with the opposite view of Guttmann and Bukofzer. The fact that a variation in the pitch does not take place is explained by the involuntary attempts of the person examined to immediately regulate the pitch.

HAFNEL.

GENERAL.

a.—REPORTS AND GENERAL COMMUNICATIONS.

400. **Grunert and Schulze.** Annual report of the University Ear Clinic in Halle, from April, 1902, to March, 1903. *A. f. O.*, vol. lix., p. 169.

401. **Spira.** Report of the Rhino-otological Department of the Jewish Hospital in Krakow in the first four months of its existence. *A. f. O.*, 1903, No. 8.

402. **Urbantschitsch.** Report of cases. *Wiener klin. Wochenschr.*, No. 45, 1903.

400. After the usual statistical data an exhaustive report of

interesting cases follows. In the first case, cholesteatoma with disease of the labyrinth, exact examination of the varying course of the disease after the operation and numerous exploratory operations did not show what intracranial complication caused the threatening symptoms. Presumably, a parietal thrombus was present which was not found at the operation on account of the severe bleeding. It is remarkable that notwithstanding the extensive disease of the labyrinth the tuning-fork C was heard increased on the deaf ear.

The second case was regarded as a spontaneous cure of a sinus thrombosis after the removal of the primary focus in the mastoid process and after evacuation of an extrasinuous abscess.

The third case was that of a child with a mild acute inflammation after broncho-pneumonia with cerebral symptoms simulating an otitic meningitis.

Of the eight fatal cases during the year, five are fully reported.

HAENEL.

401. In his report, the author recommends early paracentesis of the drum membrane in acute otitis media, and opposes the expectant treatment suggested by Zaufal and the reviewer as being dangerous and representing a step backward. It would seem that only those have a right to so severely criticise a method which represents the result of many years' observation on a large clinical material who have had personal experience with the method criticised. Inasmuch as the author has not had this, his opposition loses its force.

PIFFL.

402. 1. Rupture of the chorda tympani following an injection into the middle ear through the tube. The report of this case shows the impracticability of this procedure, and unquestionably a simple injection from the canal would have sufficed.

2. Emphysema of the drum membrane after cauterization. Two vesicles appeared on the drum membrane from elevation of the epithelium, one directly over the short process and the other in the lower posterior quadrant.

3. Chronic myringitis with division of the drum parallel to its surface. Severe cocaine intoxication.

These reports show what the ear will stand therapeutically. It, however, seems hardly wise to the reviewer that such publications should appear in a journal for the general practitioner.

WANNER.

b.—GENERAL PATHOLOGY AND SYMPTOMATOLOGY.

403. **Braunstein.** On the influence of the use of the telephone on the ear. *A. f. O.*, vol. lix., p. 240.
404. **Cagnola.** A case of toxic otitis produced by iodide of potash. *Arch. f. italiano di otol.*, etc., 1903, p. 1185.
405. **Gutzmann.** On the compensation of the senses. *Wiener med. Presse*, Nos. 46-49, 1903.
406. **Okunew.** On the frequency of the simultaneous affection of the ear, nose, throat, and naso-pharynx in soldiers. *Wojenno medicinski Shurnal*, vol. clxxix., pp. 80-90.
407. **Pollak.** Relation of the teeth to the ear. *Separat-Abdruck aus dem Handbuch von Dr. J. Scheff*, Vienna, 1902, Hölder.
408. **Bechterew.** On hallucinatory insanity in affections of the ear. *Monatsschr. f. Psychiatrie u. Neurologie*, vol. xiv., No. 3, Sept., 1903.
409. **Capgras.** Relations of one-sided diseases of the ear with hallucinations of audition. *Arch. de neurologie*, 1903, p. 500.
410. **Treitel.** Remarks on the paper of Dr. Alt on disturbances of the musical hearing. *M. f. O.*, 1903, No. 9.

403. This is the first time that this question has been investigated with the aid of a larger material. The examination included 160 officials and employees of the Munich Telephone Company, and consisted in the otoscopic condition, examination with the whisper, and the determination of the upper and lower tone-limits; the Weber, Schwabach, Rinne, and Gellé tests were made. The examination shows positively that with the aid of the new apparatus of the switch system the regular use of the telephone does not exert an unfavorable influence on the healthy ear. It also could not be shown that even on affected ears did the telephone exert an unfavorable influence, though the number of the persons examined is not sufficient to settle this point, in the author's opinion. Severe injuries to the one telephoning might result from electric discharge during showers; these injuries, however, should not produce permanent changes if properly treated. An exhaustion or diminution of hearing was noticed in no case even after a service of several hours. On the other hand, in almost all cases the person examined declared that the ear used in telephoning gained in hearing acuteness, at least for the telephonic speech. The assertion that the regular use of the telephone might cause an over-excitation of the nervous system is denied by BRAUNSTEIN. The author, however, recommends that before employing persons in the telephone service it should be seen that their hearing is normal.

HAENEL.

404. In a man, forty-one years of age, after the moderate use of iodine, symptoms of iodism appeared, which were especially marked in the case of the ear, with deafness, tinnitus, and vertigo. Otoscopic examination revealed an acute catarrhal otitis media, the watch not being perceived by bone-conduction.

The author believes that in this case the iodine not only exerted an irritating influence on the mucous membrane of the tympanum, but that iodine is to be regarded as an aural poison for the labyrinth, similar to quinine and salicylic acid. This was shown in the present case by the loss of bone-conduction.

RIMINI.

405. In exercising speech three senses are employed, namely, touch, hearing, and sight. The last is especially of great importance. In order to make use of it the mirror is necessary.

In the case of an hysterical woman, complete aphonia was caused to disappear upon demonstrating to the patient the movement of the vocal cords in a laryngeal mirror. The use of the mirror is especially of service in motor aphasia; its use is necessary in the formation of the sibilant sounds, inasmuch as the child gains feeling and sight. The mirror was also used with success in chiasm disturbances of speech and in stutterers. In all cases, it simply represents the employment of the normal compensation of senses.

The author recommends, especially in the training of deaf-mutes, the use of the eye, as Bezold has done. Unfortunately the examinations of deaf-mutes have all shown that they frequently suffer also from a disturbance of vision. In the deaf-mute institute in Berlin, 35.5 % showed defects of vision; in 29 %, astigmatism was present.

The fourth chapter treats of the deaf-mute blind. In these cases the sense of touch is the only way of education.

WANNER.

406. In a careful examination of 400 soldiers suffering from their ears, in 219 a chronic catarrh of the throat, of the naso-pharynx, and of the tubes was found present. Moreover, 83 patients suffered from adenoid vegetations in the roof of the naso-pharynx and in the proximity of the pharyngeal opening of the tube. Almost all the other soldiers suffered more or less from various affections of the nose and the pharynx, where the prophylactic treatment unquestionably prevented most ear diseases. The most suitable treatment of chronic submucous hy-

pertrophic rhinitis and pharyngitis in soldiers is cauterization and curettage. By this treatment the soldiers also gained in intelligence of appearance. SACHER.

407. The relation between the teeth and the ear results more frequently from the proximity of the ramus of the lower jaw to the auditory canal (caries, fracture) on the conjoined nerve supply; especially the lower molar teeth produce distinct action upon the ear. By way of sympathy, carious teeth may produce an irritation of the tympanic plexus, and tropho-neuroses in the tympanum (exudative catarrh of the middle ear, suppuration). Of greater importance are the reflex neuralgias, nervous otalgias from carious teeth, and nervous dentalgia from the ear. Inasmuch as pain is frequently produced in intact teeth by affections of the ear, it would be well for the dentist to have some knowledge of the examination of the ear, and the author thereupon adds a short introduction on the examination of the ear.

BRÜHL.

408. The psychic disturbances which appear after diseases of the ear are carefully described by the author after a study of the literature and the report of two personal observations.

The psychosis which develops from a disease of the ear presents hallucination with subsequent disturbances of the senses in the other organs. The sick frequently preserve their personal criticism of the hallucinations. In other cases, the hallucinations are joined by symptoms of dementia, in which the origin of the hallucinations is sought by the patient in his surroundings.

The disease differs from the so-called hallucinatory insanity, inasmuch as the disturbances of sense develop first of all in one sense organ and later in the others. Changes in consciousness and disturbances of association of ideas are absent. Recovery depends upon the possibility of improving or correcting the fundamental ear disease. KÖRNER.

409. A woman, fifty-nine years of age, suffered from typical melancholia, shortly after the menopause. In addition to horrible visions, auditory hallucinations were present. Curiously enough the threatening voices were only heard by the left ear. The ears were then examined. The right ear was normal, the left contained cerumen. After removal of this obstruction, the patient slept that night quietly for the first time, and in the following days the auditory hallucinations and all other symptoms of melancholia rapidly and completely disappeared. OPPIKOFER.

410. The author is of the opinion that in the monaural diplacusis not only the nervousness of the individual but also subjective changes in the ear are of importance etiologically. Such cases get well from treating the ear. PIFFL.

C.—METHODS OF EXAMINATION AND TREATMENT.

411. Ricardo. Illumination with acetylene gas in diseases of the ear and throat. *Arch. internat. d'otol.*, etc., 1903, p. 1244.

412. Collet. On salpingoscopy. *Lyon médical*, No. 46, 1903.

413. Bruhl. Aural syringe. *Die ärztliche Praxis*, 1903, Nos. 22 and 24.

414. Okunew. Pyoctaninum aurium and ceruleum in acute and chronic middle-ear suppuration. *Medicina*, September, 1892.

415. Urbantschitsch. On thigenol in diseases of the ear. *M. f. O.*, 1903, No. 11.

416. Fink. Aristol in rhinology and otology. *Die Heilkunde*, vol. vii., 1903.

417. Stolz. On scopolamin-morpho-narcosis. *Wiener klin. Wochenschr.*, No. 41, 1903.

418. Bloch. Narcosis with scopolamin in aural surgery. *La presse otolaryngologique Belge*, 1903, No. 12.

411. For those who cannot use electricity the acetylene lamp is recommended by Barthez as the source of illumination. It is easily managed, without odor and without danger.

OPPIKOFER.

412. The author recommends the use of the Valentine salpingoscope for the more exact survey of certain parts of the nose, of the exposed maxillary sinus, and of the naso-pharynx.

OPPIKOFER.

413. In order to avoid the reckless use of the aural syringe in ear diseases, the author mentions the dangers which may result from a non-aseptic irrigation of the ear. There are definite indications and contra-indications for the use of the aural syringe. The aural syringe may only be used when examination of the ear reveals its necessity. The author's syringe when not in use is preserved in absolute alcohol.

BRÜHL.

414. After numerous bacteriological experiments which have shown the bactericidal action of pyoktanin preparations, the author has endeavored to make use of them clinically. Forty-nine cases were treated, of which thirty-seven were chronic purulent otitis and twelve acute purulent otitis. The substance was used in a watery solution and instilled in drops. The drops were employed twice daily. Unpleasant action of the

pyoktanin treatment consisted in inflammatory stenosis of the canal, pain in the ear, and headache. The yellow pyoktanin is the better, as it is less irritating and does not discolor the tissues so much and permits a better survey of the drum.

SACHER.

415. The author has employed thigenol in chronic middle-ear suppuration with varying result. In the acute purulent diseases of the ear, the anæsthetic action of the drug diminished the pain so that paracentesis could be avoided. Inflammations of the external canal were healed, and the eczema of the auricle was improved. In one case of chronic suppurative otitis media with cholesteatoma, the cholesteatoma, the suppuration, and the headaches were relieved. The drug was employed in a concentration of 10-20 per cent. in a solution of glycerine and alcohol; also in the form of a salve and as a powder.

PIFFL.

416. Fifty-five cases of nervous rhinitis were favorably treated by insufflating aristol into the maxillary sinus in chronic purulent otitis media. Aristol is better than boric acid.

BRÜHL.

417. As it is not possible to obtain uniform preparations of scopolamin which will counteract the poisonous effect of morphine on the respiration, this form of anæsthesia must remain on trial. The important agent is the morphine. The author concludes that the narcosis obtained by scopolamin-morphine cannot compare in any way with the ordinary inhalation narcosis, both as regards the depth or the regularity of the administration. Of 465 patients, about 309 could be anæsthetized by injection. All the others required inhalation. A mortality of 0.6 % is also not particularly encouraging. One patient exhibited a deep asphyxia, nine showed light grades of asphyxia, and cardiac weakness was frequently observed.

WANNER.

418. After a description of his procedure with scopolamin, the author believes that this form of anæsthesia has a favorable future.

BRANDT.

d.—DEAFMUTISM.

419. Siebenmann. Report on the anomalies of the labyrinth in congenital deafmutism. *Verhandl. der naturforsch. Ges. in Basel*, vol. xvi.

420. Brühl. The hearing of deaf-mutes. *Deutsche Ärzte-Zeitung*, 1903 No. 6.

421. Vali. On the value of hearing-exercises in deaf-mutes. *M. f. O.*, 1903, No. 11.

419. From recent anatomical investigations of ALEXANDER and SIEBENMANN it seems that the two vestibular saccules and the semicircular canal have no auditory importance, and that the site of perception for noises, as well as for tones, must be located in the cochlea, especially in Corti's organ.

A very frequent form of intra-uterine genesis of deafness and deafmutism is furnished by conditions of collapse in the labyrinth, which are carefully described. The causes for this are to be found in malproportion between the labyrinth, which is primarily too large, and the bony framework, which remains of natural size. BRÜHL.

420. This gives a literary survey and explanation of the hearing possessed by deaf-mutes by means of schematic drawings of the cochlea. The author examined with Hartmann 116 deaf-mutes in the deaf-mute school at Berlin. Of these, 9 could not be examined. Of the remaining 107, 44 % were born deaf; 43.9 % were totally deaf; 56.1 % had hearing remnants for tones; in 32.8 % these remnants could be used in instruction; and 20.5 % had hearing for words. The examination was conducted with the voice, with tones C, c¹, c², c⁴, a¹-a², and Galton's whistle. BRÜHL.

421. The author has examined the deaf-mutes in the institute in Vác, who have been instructed by means of methodical hearing-exercises, after Bezold and Urbantschitsch, for one year. It was shown that pupils who at the beginning could only hear very poorly, after a year were all able to hear vowels. The pupils with vowel-hearing possessed in part hearing for words, and others also hearing for speech. The results, therefore, of the hearing-exercises can be regarded as favorable, and the author recommends hearing-exercises for deaf-mutes, after the combined Bezold-Urbantschitsch method to preserve and improve upon the remnants of hearing. PIFFL.

EXTERNAL EAR.

422. Gersuny. On a number of cosmetic operations. *Wiener med. Wochenschr.*, No. 48, 1903.

423. Heilmann. Communication on artificial ear-drums. *La presse otolaryngologique Belge*, 1903, No. 11.

422. 1. Diminution of the auricle. GERSUNY resected a strip of the auricle running parallel to the helix out of the cartilaginous part extending from the lobule nearly to the insert of the

auricle. The auricle was thus diminished in size corresponding to the breadth of this strip. In order to approximate the auricle to the head, the incision is to be made so that the resected strip will be broader on the posterior surface than on the anterior. The same operation has been employed for malignant tumors of the auricle. The method is illustrated by a drawing.

2. Operation for prominent ears. Curved incision behind the auricle with complete detachment down to the auditory canal. From the posterior surface of the auricle a strip of variable breadth is resected and the auricle is attached to the periosteum by broad sutures.

3. Diminution of the nose. In regard to the injection of paraffin, the author believes that it is immaterial whether we use hard paraffin or paraffin ointment. It must not, however, be in a fluid condition.

WANNER.

423. HEIMANN observed that an artificial drum consisting of a thin layer of absorbent cotton was well borne by one ear without the recurrence of the otorrhœa. The purulent discharge, however, began directly upon inserting the artificial drum in the second ear. After this discovery, the author only places the artificial drum in one ear. He is unable to give an explanation for this remarkable condition, but thinks that possibly it is due to the ventilation of the middle ear.

BRANDT.

MIDDLE EAR.

a.—ACUTE OTITIS MEDIA.

424. Heine. On the treatment of acute otitis media. *Deutsche med. Wochenschr.*, No. 48, 1904.

425. Müller. On dry treatment of acute purulent otitis. *Deutsche militärärzt. Zeitschr.*, 1903, No. 9.

426. Alexander. On the treatment of acute periostitis of the mastoid process by constant heat. *M. f. O.*, 1903, No. 9.

427. Urbantschitsch. On the filling in of operative cavities with paraffin. *M. f. O.*, 1903, No. 9.

428. Heimann. On the medical treatment of acute otitis media. *La presse oto-laryngologique Belge*, 1903, No. 9.

429. Haug. On hemorrhagic otitis media in connection with the development of the upper anterior molar. *A. f. O.*, vol. lix., p. 318.

430. Barbillon. Septic infection of otitic origin in nurslings. *Revue mens. des mal. de l'enfance*, 1903, p. 487.

431. Vernieuwe. Contribution to the study of the anatomy of the mastoid apophysis. *La presse oto-laryngologique Belge*, 1903, No. 8.

424. Zaufal and his followers consider at present that acute otitis media frequently runs a cyclic course, and that it is possible in many cases to heal the disease by the application of warm compresses of acetate of aluminum without the usual paracentesis of the drum membrane, and without spontaneous perforation and evacuation of the secretion collected in the tympanum. HEINE does not deny that under certain conditions paracentesis may exert an unfavorable influence on the disease, inasmuch as access is given to streptococcic and staphylococcic infection through the artificial opening. These organisms, as is well known, are very much more malignant than the usual pyogenic agents in acute otitis media, namely, the diplococcus of pneumonia and the pneumococcus. On the other hand, if paracentesis be not practised, the patient may run considerable danger, as a thickened drum will cause the retained pus to travel toward the mastoid process and into the skull. He is therefore of the opinion that paracentesis should always be performed when the drum bulges, associated with pain and fever. Tenderness and periotitis of the mastoid process frequently tend to disappear if paracentesis has been performed. Irrigations from the canal and the air douche are unnecessary. It is sufficient to introduce a piece of sterile gauze loosely into the canal. NOLTENIUS.

425. MÜLLER's conclusions are as follows: A dry treatment is pleasant for the patient and easy for the physician; it fulfils the conditions; it gives the disease a mild and rapid course. It is applied as follows: A piece of sterile gauze is introduced to the depth of the canal and the ear is covered with compresses of gauze and a bandage. The dressing is changed in twenty-four hours; if the discharge is very free, more frequently. Of 301 cases treated by this method, 279 recovered, 18 were operated upon, and 4 were discharged unhealed, as they refused operation. BRÜHL.

426. ALEXANDER has treated acute inflammation of the mastoid with an apparatus recommended by Ullmann, after the principle of Leiter's coil. A result is only to be expected in recent cases where there is no profuse suppuration in the mastoid process. If the process is more advanced, the use of constant heat has only an anæsthetic action. PIFFL.

427. In two cases of tardy healing after operation for acute mastoiditis, the wound cavity was filled with solid paraffin in

order to stimulate the formation of granulations. In a short time the cavity closed.

In order to correct an introductory remark of the author, we wish to state that Zaufal has not recently employed the primary total suture after operations for acute mastoiditis. This was tried about ten years ago in a number of cases and with quite good results. To-day, in Zaufal's clinic only the partial primary suture is employed and the duration of healing is thereby decidedly shortened. This point has been especially mentioned by the author in his paper on the subject, based upon 68 cases. At the present day the list of cases is increased to 200.

PIFFL.

428. Owing to the general repugnance on the part of Poles to any surgical intervention, the author has been in the habit of treating acute otitis as follows: Leeches to the mastoid process; either iced or warm compresses—whichever was most agreeable to the patient; pain-relieving instillations into the auditory canal; large doses of salicylic acid; rest in bed, and diet. With this treatment, in 12 cases out of 48 paracentesis was found necessary. The duration of the disease was about 10 days. Of those cases not treated by paracentesis, 6 became chronic, 2 developed an inflammation of the mastoid, in 1 the disease was tuberculous. The drum membrane is only incised when this form of treatment is without result. The use of salicylic acid is very warmly recommended.

BRANDT.

429. In a young girl, twelve years of age, with a previously healthy ear, a typical acute hemorrhagic middle-ear exudation occurred simultaneously with toothache in an upper molar tooth and insignificant pain in the ear; after the formation of a hemorrhagic bleb on the gum, the pain was relieved, but could be reproduced by touching the site of the bleb. All of the symptoms disappeared except the subjective noises. After opening the hematoma, these also disappeared. Associating causes for this peculiar clinical picture are furnished by heart disease and chlorosis, the age of the patient—namely, the beginning of puberty,—and the hystero-neuropathic disposition.

HAENEL.

430. In nurslings which come to autopsy a purulent otitis is usually found. The catarrh of the stomach and of the intestines is a symptom of sepsis, originating in the ear. A diagnosis of

gastro-enteritis is made and treated, while the primary middle-ear suppuration is overlooked.

OPPIKOFER.

431. VERNIEUWE gives five interesting horizontal sections through various mastoid processes, and with the aid of four clinical histories the various courses of an inflammation following an acute otitis media are described, according as the mastoid process is pneumatic or eburnated. In chronic suppurations, the anatomical structure of the mastoid process is also of importance, and complications from the side of the sinus are more easily explained in cases where the inflammation extends to the cells in the immediate proximity of the sinus, or in which defects are present in the bony walls of the sinus.

BRANDT.

b.—CHRONIC PURULENT OTITIS.

432. **Compaired.** Chronic purulent otitis, with epithelioma of the middle ear and of the mastoid process. Radical operation and recovery. *Archivo Italiano di Otologia*, etc., vol. xiv., No. 4.

433. **Zaalberg.** On operations of the labyrinth. *M. f. O.*, 1903, No. 10.

434. **Aspiasow.** A case of rupture of the internal carotid artery in disease of the middle ear. *Wojenno med. Shurnal*, October, 1903.

432. The radical operation was undertaken in a patient thirty-six years of age, and particles of the tumor were removed from the middle ear, attic, and antrum, which proved to be epithelioma on examination. The case healed.

RIMINI.

433. After describing the indications given by Jansen and the various methods for the operative opening of the labyrinth, an interesting case of a labyrinthine inflammation is given, which followed inadvertent opening of the horizontal semicircular canal during the radical operation, and which was finally cured by the removal of the semicircular canals and opening of the vestibule. The cochlea was not opened.

PIFFL.

434. The patient, a young soldier, suffered from chronic otorrhœa for seven years. There was a total defect of the drum and of the ossicles. Examination with the probe revealed bare and rough bone. A few days after admission to the hospital, the facial nerve on the affected side became paralyzed. Two days before the first bleeding, the temperature rose to 39° C. During the hemorrhage, blood escaped from the ear in a stream as thick as the small finger, with distinct pulsation. During the

attempts at checking the bleeding with packing, the patient lost about a litre of blood. During the next few days, the hemorrhage recurred in slight quantities. The autopsy showed acute purulent meningitis, tuberculous meningitis, chronic suppurative otitis media, acute purulent osteomyelitis and caries of the petrous pyramid, rupture and arteritis of the right internal carotid, septic pyæmia. The hemorrhage was produced by the complete carious destruction of the wall intervening between the drum cavity and the carotid canal. The internal carotid was destroyed to a large extent, so that the two extremities were quite far apart.

SACHER.

C.—CEREBRAL COMPLICATIONS.

435. Beco. A case of abscess of the temporal lobe following old otorrhœa. *Annales de la société mèd-chirurg. de Liège*, 1903, p. 535.

436. Kissel. A case of brain abscess, in the temporal lobe of a child, of otitic origin. Death. Autopsy. *Djetskaja Medicina*, 1903, No. 2.

437. Cheval. Oto-laryngological clinic of the St. Pierre Hospital. Introductory lecture. *La presse oto-laryngologique Belge*, 1904, No. 1.

438. Konietzko. The pathological examination of a case of middle-ear tuberculosis, beginning cholesteatoma, and tuberculous meningitis. *A. f. O.*, vol. lviii., p. 206.

439. De Stella. Two cases of acute purulent otitis media with endocranial complications. *Arch. internat. d' otologie*, etc., 1903, p. 1220.

440. Donath. On the diagnostic and therapeutic value of lumbar puncture. *Wiener klin. Wochenschr.*, No. 49, 1903.

441. Schulze. On the dangers of ligating the jugular vein and occlusion of the sinus in otitic sinus thrombosis. *A. f. O.*, vol. lix., p. 216.

442. Luc. Aural pyæmia without sinus thrombosis. *La médecine moderne*, Paris, 8th year, No. 55.

443. Francis Huber. Otitic serous meningitis; lumbar puncture; recovery. *American Medicine*, New York, Dec. 5, 1903.

444. Goldstein. An unusual case of spontaneous bilateral hemorrhage from the middle ear. *The Laryngoscope*, St. Louis, August, 1903, p. 577.

435. An abscess in the temporal lobe following chronic middle-ear suppuration in a child seven years of age. The abscess was opened and drained. Five and a half months later, apparent recovery. Eight months after operation severe symptoms of brain abscess recurred. Autopsy revealed a second abscess in the temporal lobe which had perforated into the lateral ventricle and led to purulent meningitis.

OPPIKOFER.

436. The fulminating clinical picture was regarded during lifetime as an encephalitis of infectious origin. At autopsy a

bilateral purulent otitis and an abscess in the right temporal lobe were found.

SACHER.

437. A case of severe brain abscess is reported which is interesting on account of the multiplicity of the abscesses and on account of the great distance of the second abscess from the original one in the temporal lobe (in the centre of the fissure of Rolando).

BRANDT.

438. Tuberculous disease of the entire middle-ear mucous membrane, extensive infiltration in the attic, in the floor of the tympanum, and in the proximity of the stapes. The membranes of the windows and of the labyrinth were intact. The following condition of the drum is unusual: The epidermis passes through the central perforation over the mucous membrane of the drum, which is tuberculous and without epithelium, and sends off irregular strings of cells into the granulation tissue (beginning cholesteatoma).

HAENEL.

439. Case 1. Left acute purulent otitis in a boy nine years of age; perisinusitis and Bezold's mastoiditis. Operation, recovery.

Case 2. A boy four years of age; acute purulent otitis, perisinusitis, purulent sinus thrombosis, subdural abscess over the cerebellum. The sinus was operated, also the subdural abscess. Death. No autopsy.

OPPIKOFEK.

440. This article is very readable and presents two cases of otitic meningitis of interest for the specialist. In one individual, after the puncture the pain disappeared, while opening the mastoid process exerted no favorable influence in the other case. Puncture was performed three times at long intervals and a purulent fluid was always found. With each puncture the symptoms were relieved.

In acute meningitis, lumbar puncture may be performed every day at one or the other interarcual space, until the fluid proves to be normal. Puncture is furthermore recommended in brain abscess which is not localizable or is difficult of access. Sterilized salt solution at the body temperature is injected with a syringe and the dural sac thus irrigated; the quantity made to equal the evacuated liquor or measure up to 30ccm. Diagnostically the presence of many lymphocytes and polynuclear leucocytes cannot be regarded as pathological.

WANNER.

441. The dangers of ligating the jugular consist in disturbances of the circulation by obstruction of the blood current. The circulation is then taken care of by the venous channels of the opposite half of the skull, the collateral tracts of the same side, the facial vein, and the external jugular vein. In order to preserve the facial vein for the collateral circulation, the ligation should be undertaken, if possible, above its entrance into the jugular vein. The condition of the cranial sinus is also of importance for the regulation of the blood flow. If the sinus is not obstructed, the emissaries will carry off the blood. Upon thrombosis of the sinus, the degree of congestion depends upon the site of the thrombus. Dangerous disturbances of the circulation have been rarely met with up to the present time. In these cases there has always been an anomaly in the size of the sinus, usually an abnormal narrowness of the sinus of the healthy side, or a bilateral obstruction of the sinus or of the internal jugular vein.

Bilateral occlusion of the sinus does not necessarily cause death, as has been shown by a case observed in the Halle clinic, in which the threatening symptoms—absolute coma, motor irritation—disappeared gradually on the second day. In the fatal cases, congestive hyperæmia, œdema, and congestive necrosis of the brain are found, as well as capillary and even extensive hemorrhages in the brain and in the cranial membranes. The view of Hölscher—that if the sac is opened the conditions for the restoration of circulation are more favorable—was confirmed by the material collected by Schulze.

Typical signs for the presence of a dangerous asymmetric development of both sinuses are not known. The dread of ligating the jugular in a case of asymmetric sinus-formation does not enter into account with the many favorable results of this operation. If, however, we have determined that an occlusion of the main venous channel of the opposite side is present, the operation must be undertaken according to each case. In an obstructed sinus-thrombosis which up to the present time has not shown any disturbance of the circulation, it can be expected that a jugular ligation can be undertaken without being followed by any circulatory disturbances.

HAENEL.

442. Two typical cases of pyæmia without sinus phlebitis. In the one case, metastases formed in the various joints; as the symptoms of mastoid empyema were absent, a paracentesis alone was performed. Recovery. Finally the differential diagnostic

points between pyæmia with and without sinus thrombosis are given.

RIMINI.

443. Child, aged two. Fourteen days before admission to hospital, child became restless. Four days before admission, general convulsions began, occurring every thirty minutes. Commencing with a loud cry, child would fall. Movements were both tonic and clonic. The attacks lasted about three minutes. Occasional vomiting after an attack, or the child would cry and fall asleep. The convulsions occurred night and day and were brought on by any external irritation. Examination, January 8th. Face suffused, expression dull. Child is apathetic and semi-conscious. Extremities cold and blue. Surface is mottled. Tongue coated and moist. Eyes: convergent strabismus and moderate lateral nystagmus. Pupils dilated, the right most; contract with light moderately, then slowly dilate and again contract. *Tâches cérébrales* are easily produced. An offensive purulent discharge from the right ear. No tenderness or œdema over the mastoid region or side of skull. Pulse rapid and regular. Exaggerated reflexes. January 11th, mastoid opened, but not the dura. The same day lumbar puncture was performed; 30g of spinal fluid withdrawn. Little change. January 12th: Sixteen grams more fluid taken away. The symptoms gradually improved, and the patient was discharged February 2d, twenty-two days after operation. Two months later, was perfectly well.

W. S. BRYANT.

444. The patient was under careful observation for over one year, and there was no malingering. The hemorrhage was independent of the menstrual function. Miss X., white, age twenty-two; hysterical; good family history. February, 1902, with an hysterical attack she had pain and bleeding in both ears. The left ear soon stopped. The right continued to bleed more or less for eleven months. The fluid from the case appeared microscopically to be serum containing a little blood. It did not coagulate. Both membranes were intact and normal. Headache or sense of pressure just before the attack came on. The discharge occurred at regular intervals, at first every half hour. When the patient was under some nervous excitement, it was more frequent and abundant. The amount of fluid was about 1cc at a time. The discharge was more frequent by night and in the recumbent position. Four days after Dr. GOLDSTEIN saw the patient, the discharge from the left ear ceased. The other ear

continued to discharge for five weeks without an intermission of more than eight hours. The patient's blood count was: red, 3,000,000; white, 5000. The bleeding point was not located more definitely than that it was near the juncture of the posterior wall and membrane. The fluid suddenly welled up in the canal while it was under observation. The discharge was gradually decreased, but the pads of cotton worn over the ear were often soaked with the discharge. There was an exploratory incision of the tympanum done and packing without any result. Patient gained in weight in spite of the discharge. There was no evidence of inflammation, rise of temperature, or serious symptoms. Cure was accomplished by radical suggestion, and no recurrence for six weeks at the date of writing.

W. S. BRYANT.

(To be concluded.)

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